IDEAS AS INSTITUTIONS: EXPLAINING THE AIR FORCE'S STRUGGLE WITH ITS AEROSPACE CONCEPT

A THESIS

PRESENTED TO THE FACULTY

OF

THE FLETCHER SCHOOL OF LAW AND DIPLOMACY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

DEGREE OF DOCTOR OF PHILOSOPHY

APRIL 2006

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Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE **19 JUN 2006**	2. REPORT TYPE **N/A**	3. DATES COVERED **-**

4. TITLE AND SUBTITLE **Ideas As Institutions: Explaining The Air Forces Struggle With Its Aerospace Concept**	5a. CONTRACT NUMBER 5b. GRANT NUMBER 5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER 5e. TASK NUMBER 5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **TUFTS University**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) **AFIT/CIA, Bldg 125 2950 P Street WPAFB, OH 45433**	10. SPONSOR/MONITOR’S ACRONYM(S) 11. SPONSOR/MONITOR’S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**UU**	**417**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

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Abstract

Ideas matter, but before they do, they must first establish themselves. This dissertation explores how organizations come to embrace the ideas that they do. Its findings suggest that ideas stick within organizations not simply when they make sense, or when they further an organization's goals and objectives. On the contrary, in order to persist, ideas also need committed proponents, structures to adhere to, and resources for nourishment. Moreover, ideas stand a better chance of taking root and strengthening when they are congruent with the organization's external context. In short, this dissertation suggests that ideas emerge, permeate, and persist within organizations in the same way that institutions do within cultures.

These broader findings spring from a case study that details the history of the aerospace concept—a simple idea born and perpetuated within the United States Air Force in which "air" and "space" are seen as a single indivisible medium rather than as two different places. The concept has long been an official position of the Air Force, but it has never fully taken hold. This describes a paradox of sorts: on one hand, the aerospace concept is strong enough to persist as long as it has, but on the other, it is not strong enough to stick.

To understand this apparent inconsistency, the dissertation evaluates the aerospace concept as if the idea was an emerging institution within the Air Force. First, it derives a hybrid institutionalization process model by bridging two disparate sources within

institutionalism's literature. Next, the study refracts the concept's developmental history, reassembled chronologically from an admixture of archival and secondary source data, through this model. Doing so illuminates the variety of variables influencing the concept's development, some of which are within the Air Force's span of control, others beyond it. The method also highlights the important insight that ideas penetrate organizations over time and by degree. Finally, it demonstrates that evaluating ideas as if they were institutions allows us to locate and track their developmental "footprints," to chronicle and examine more clearly their temporally progressive histories, and from there to predict with better confidence their future paths.

Acknowledgements

Journeys such as these simply cannot happen without the help of others. I welcome the chance here to express my sincere gratitude to those who made mine possible. First, I thank the U.S. Air Force's School of Advanced Air and Space Studies. Without its three-year sponsorship and the continued support thereafter of my colleagues on its faculty, I would never have been able to walk this path. It was an honor to be provided the opportunity, and I am humbled now to be given the chance to return some of this wonderful school's investment in me.

Second, I am indebted to my dissertation committee. Professor Robert Pfaltzgraff, my Dissertation Director, took me under his fold and then allowed me the room to explore wherever this study took me. Professor William Martel, besides his numerous insights on how to improve this product, remained a constant and comfortable source of encouragement. Professor John Curtis Perry was, and remains, an intellectual inspiration. His standard of inquisitiveness, eloquence, and perspective will be a goal I can only hope to achieve someday. From where I sit, these three scholars complemented each other perfectly and together formed an ideal committee. Thank you.

Finally, to my wife and our daughter and son, anything I attempt to say here can only fall short of what I wish to express. This journey would have been an agonizingly lonely and likely unsuccessful one if not for your endless and

unquestioned support. Every single step and misstep of the way you all hung in there with me, shouldered whatever needed shouldering, kept my path cleared as I trudged along, and picked me up every time that I stumbled. The three of you are my love and my life. And this dissertation is truly ours to share.

The views expressed in this article are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government.

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List of Abbreviations

AAF	Army Air Force
ABMA	Army Ballistic Missile Agency
AFBMD	Air Force Ballistic Missile Division
AFLC	Air Force Logistics Command
AFM	Air Force Manual
AFSC	Air Force Systems Command
AMC	Air Materiel Command
ARDC	Air Research and Development Command
ARPA	Advanced Research Projects Agency
ASD	Aeronautical Systems Division
AUQR	*Air University Quarterly Review*
BOMI	Bomber-missile
BSD	Ballistic Systems Division
CIA	Central Intelligence Agency
CIT	California Institute of Technology
CNO	Chief of Naval Operations
COPUOS	Committee on the Peaceful Uses of Outer Space
DDR&E	Director of Defense Research and Engineering
DoD	Department of Defense
ESD	Electronic Systems Division

FY	Fiscal Year
ICBM	Intercontinental Ballistic Missile
ICSU	International Council of Scientific Unions
IGY	International Geophysical Year
IRBM	Intermediate Range Ballistic Missile
JCS	Joint Chiefs of Staff
LL	Legislative Liaison
MISS	Man-In-Space-Soonest
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NASC	National Aeronautics and Space Council
NATO	North Atlantic Treaty Organization
NRL	National Research Laboratory
NRO	National Reconnaissance Office
NSAM	National Security Action Memorandum
NSC	National Security Council
ODMSC	Office of Defense Management's Science Committee
OMSS	Office of Missile and Satellite Systems
R&D	Research and Development
SAB	Scientific Advisory Board
SAC	Strategic Air Command
SAG	Scientific Advisory Group
SSD	Space Systems Division
TCP	Technology Capabilities Panel

UN	United Nations
USAF	United States Air Force
WADC	Wright Air Development Center
WADD	Wright Air Development Division
WDD	Western Development Division
WSSG	Weapon Systems Study Group

Chapter 1

Introduction

Ideas matter. They are "the pictures in our heads," explains Walter Lippmann, that influence directly how we choose to act upon the world.[1] Max Weber credits them for creating the world images that, like switchmen, determine the tracks down which human action is propelled.[2] Within organizations, ideas inform policy, shape agendas, and influence outcomes.[3] But first, they must somehow establish themselves. They must, to paraphrase Lippmann, make their way into the organization's "head." They must find institutional footing.

This study furthers an understanding of this process. Its findings suggest that ideas stick within organizations not simply when they make sense, or, as rational choice models would indicate, when they forward an organization's goals and objectives. The persistence of ideas within organizations also depends on care and feeding. Ideas need proponents, they need structure to adhere to and embed within, and they require resources

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[1] Walter Lippmann, *Public Opinion* (New York: Hardcourt Brace & Co., 1922), 10, 11.

[2] Max Weber, "The Social Psychology of World Religions" (1913), in *From Max Weber: Essays in Sociology,* H. H. Gerth and C. Wright Mills, eds. (New York: Oxford University Press, 1958), 280. .

[3] See, for example, Judith Goldstein and Robert O. Keohane, eds., *Ideas and Foreign Policy: Beliefs, Institutions, and Political Change* (Ithaca, N.Y.: Cornell University Press, 1993), Peter A. Hall, ed., *The Political Power of Economic Ideas: Keynesianism Across Nations* (Princeton, N.J.: Princeton University Press, 1989), or Stephen Van Evera, "The Cult of the Offensive and the Origins of the First World War," *International Security* 9 (Summer 1984): 58-107.

for sustenance and nourishment. In addition, an idea's potential to accrue and sustain internal traction also depends on its congruence with the organization's external context, a context over which the organization normally has little to no direct control. Finally, and perhaps most importantly, ideas penetrate organizations over time and by degree; the deeper their penetration, the greater their influence upon organizational action. In sum, the process of how ideas establish themselves within organizations is both complex and dynamic, and can be better understood when examined as a process of institutionalization.

The aerospace concept is an idea whose developmental history illuminates all of these observations. Innovated, advocated, and perpetuated by the United States Air Force, "aerospace" holds it more accurate to see "air" and "space" as a single indivisible medium rather than as two different places. The concept simply describes an image of the region above the earth's surface that is a continuous whole. Its straightforward meaning, however, belies a contentious and perplexing history best introduced by looking for a moment at what this history has wrought.

THE PROBLEM

Today's Air Force struggles with a nagging identity issue—one that developed over many years, has recently found expression at the highest levels of the organization, and centers around the aerospace concept. The contrasting perspectives of the service's latest two senior-most officers frame the issue clearly.

General Michael E. Ryan, the Air Force chief of staff from October 1997 until September 2001, designed an organizational vision for the Air Force around this statement:

> An aerospace force is based on the view that air and space form a single, seamless operational medium. Based on our doctrine and our culture, this view will allow us to further our warfighting capabilities.[4]

On this basis, Ryan developed a strategic plan to steer the Air Force well into the new century. His immediate successor, however, brought that plan to a halt, for he held a different perspective.

General John P. Jumper, in his first major public address delivered just forty-five days following Ryan's retirement, had this to say about his predecessor's viewpoint:

> The term aerospace fails to give proper respect to the culture and to the physical differences that abide between the physical environment of air and the physical environment of space. We need to make sure we respect those differences. So I will [now] talk about air and space. I will respect the fact that space is its own culture, that space has its own principles that have to be respected.[5]

Both of these statements were measured and deliberate. Likewise, both of the four-star generals who made them were neither naïve, nor out of touch with the service they had come to lead. Yet one asserts that the aerospace view is steeped within the Air Force, the other observes that it is not. More interestingly, both positions rest on firm ground.

From General Ryan's standpoint, the aerospace concept has long been a mainstay idea of the Air Force. First germinating in late 1944, it gradually took root and by 1958, acquired both its single-word "aerospace" moniker and its status as an official Air Force position. Remaining as such over the next forty years, the service used the notion to forward what it saw as the seamless realm of its responsibility. Land and sea are to the

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[4] U.S. Air Force, *The Aerospace Force: Defending America in the 21st Century* (Washington, D.C.: GPO, May 2000), 3 (accessed 12 June 2005); available from http://www.af.mil/lib/taf.pdf.

[5] John P. Jumper, General, chief of staff, U.S. Air Force, "Solving Problems for the Future" (Address, Air Force Association National Symposium, Los Angeles, CA, 16 November 2001), 4 (accessed 21 October 2004); available from http://www.aef.org/pub/jump1101.asp.

Army and the Navy, went the analogy, as aerospace is to the Air Force. Indeed, in an organization whose *raison d'être* rests on the intellectual arguments of air power theory, the concept has long found fertile ground.[6] Successive generations of leadership promulgated the idea and it became ensconced in the service's basic doctrine, which codifies "officially sanctioned beliefs, warfighting principles, and terminology," and, in the Air Force's own words, "captures our Service's identity."[7]

Yet even a casual observer of today's Air Force will see an organization that reflects the opposite viewpoint. The technologies it has developed and organizational structures it has created through which to employ these technologies all reinforce the notion that space is separate and distinct from the atmosphere.[8] Moreover, two considerably different sub-cultures exist around these structures—one air-centric, the other space-centric.[9] This was the air and space force of which General Jumper spoke.

The puzzle herein is this: The Air Force has become an organization that embodies, and operates in a way that perpetuates, a perspective wholly inconsistent with the aerospace concept it has long espoused. If how the Air Force views the world—as both

[6] Air power theory—oversimplified vastly here but sufficient for present purposes—posits that in warfare, control of the sky enables control of the surface beneath it. This is because the freedom to impose military force unchallenged from above enables the ability to destroy an enemy's capacity to fight. Where this study is concerned, the operative word here is "above," which implies no limit. To control the atmosphere *only*, but not the space above the atmosphere, by the theory's own logic, is *not* to control the surface below. Thus, from the airman's *theoretical* perspective, space has always extended naturally and seamlessly from the atmosphere.

[7] U.S. Department of the Air Force, Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine* (17 November 2003), 3, 2.

[8] Aircrew, for example, fly aircraft out of squadrons organized under the Air Combat or Air Mobility Commands, while space operators launch and "fly" satellites out of space operations squadrons organized under a Space Command.

[9] See Kevin J. McLaughlin, "Military Space Culture," Appendix 2, Staff Background Papers, of *Report of the Commission to Assess United States National Space Management and Organization* (11 January 2001). Prepared for U.S. Congress, Joint Committee on Armed Services.

Lippmann and Weber suggest—directly influences its actions, then what accounts for this divergence? Indeed, the service looks and acts so un-aerospace-like, it is intriguing that the idea even exists, let alone enduringly enough to stimulate the recent attention of the service's most senior leaders. At the heart of this puzzle lies a subtle paradox, centered on the aerospace concept itself, and framed by the following questions: *If the Air Force has resisted embodying it, why does the aerospace concept persist?* And conversely, *given such staying power, what keeps the aerospace concept from "sticking"?*

These questions ply a broader basin of intellectual waters that address the relationship between ideas and human action. More specifically, the aerospace concept is a vessel in which to explore how ideas embed within organizations. Their answers not only deepen our understanding of this process, but they emerge from the past, during the concept's formative years, and thus bring a unique perspective to the historical record. Exploring in depth the development of a fundamental conceptual issue that propelled the Air Force's involvement in space casts new light upon the broader saga of how and why America developed its military space capability. History tells us both why the aerospace concept persists and why it fails to stick. Scholars have thus far left these questions undisturbed. Together, they motivate this study.

METHOD AND STRUCTURE

Institutionalism provides the theoretical foundation for this dissertation. Specifically, to extract, organize, and present its data from the sea of historical data that surrounds the history of the aerospace concept, this study employs a methodological framework derived from models that describe how institutions develop. Implied in this choice—and explicit in the dissertation's title—is the likening of ideas to institutions and a corresponding assumption that ideas develop within organizations in the same way that institutions develop within society. Indeed, lending credence to this connection is a broader objective of this study. Chapter 2 includes a detailed argument supporting the validity of this approach, but for introductory purposes, a short explanation is in order.

The plausibility of considering ideas as institutions rests on an unfamiliar, but well-respected definition of "institution." Herein, institutions are not organizations. Rather, they are the commonly shared meanings existing among a group of actors, which, in their mature form, go generally unquestioned and as such, implicitly or explicitly govern the group's action.[10] Marriage, for example, is an institution within society, just as communion is within the Catholic Church, or the vote is within democracies. Nobel Laureate Douglass C. North nicely summarizes the distinction this study makes between institutions and organizations. "Institutions are the rules of the game," he submits, "[while] organizations and their entrepreneurs are the players."[11] This study simply asserts that the similarities between institutions of this sort (the *shared meanings that govern action*) and ideas (the *pictures in our heads that determine the tracks down which human action is propelled*) are compelling enough to invoke a comparison, and to suggest that models describing how institutions emerge and embed within social groups can be leveraged to explain and understand better how ideas emerge and embed within organizations.

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[10] This is a plain-English derivation of a definition proposed by sociologists Peter L. Berger and Thomas Luckmann. In their book, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge,* (Garden City, N.Y.: Doubleday & Company, Inc., 1966), on page 51, they define institution as a "reciprocal typification of habitualized actions." As noted above, an explanation of this definition and its utility to this study are explored in detail within chapter 2.

[11] Douglass C. North, "Economic Performance Through Time," *The American Economic Review* 83, no. 3 (June 1994): 361.

On this premise, chapter 2 also introduces a hybrid model for institutional development that characterizes the progressive phases of the process and highlights the various factors that influence its course. Drawn from wholly disparate branches of institutionalist theory, this hybrid merges two existing models—one that focuses on internal factors within a group of actors that influence institutional development, the other that weighs a group's external context more heavily in the process.[12] The resulting product capitalizes on each of their differing strengths, builds a theoretical bridge between two largely independent areas within the theory, and creates the framework around which this study organizes and presents its data.

Essentially, this dissertation establishes the aerospace concept as its dependent variable, and through a historical discourse presented in chapters 3 through 7, explores the idea's development as if it were an institution emerging within the Air Force. In doing so, the study examines eight different factors, or independent variables, influential in this process. Four are internal to the Air Force, within the service's span of control, and thus affect the concept's institutionalization directly. These are *leadership focus* (empowers concept development), *theorizing* (justifies it), *resource mobilization* (enables it), and *organizational structure* (percolates and perpetuates it).[13] The remaining four

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[12] The first is a model from the historical institutionalist perspective derived from Kathryn Sikkink's *Ideas and Institutions: Developmentalism in Argentina and Brazil* (Ithaca, N.Y.: Cornell University Press, 1991). The second model, from the sociological institutionalist point of view, is culled from Pamela S. Tolbert and Lynne G. Zucker's "The Institutionalism of Institutional Theory" from the *Handbook of Organization Studies,* ed. Stewart R. Clyog, Cynthia Hardy, and Walter R. Nord (Thousand Oaks, Calif.: Sage Publications, 1996), 175-90. There is not a single reference overlap in over 350 different sources between these two works combined. Yet, each model, short of its focus, is practically interchangeable with the other. Scholars of institutionalism theory should find this significant, given the fractious and multi-faceted nature of the field. Chapter 2 presents, compares, and combines these models in much greater detail.

[13] Naturally, an undermining effect is also possible with each of these variables.

variables are external to and independent of the service, and affect the concept's institutionalization indirectly. These variables are the *international security climate,* the *relevant national policies* that address that climate, the *interagency competitive climate* composed of those organizations vying with the Air Force for limited resources, and the *general technology environment* that influences the aerospace concept's technological viability.

Chapter 3 begins the historical narration. It focuses on the earliest period of the concept's development, from its inception in the fall of 1944 to the close of the Truman presidency at the end of 1952, still well before the idea had a name. At the conclusion of this period, the concept was clearly discernible and on the verge of establishing a legitimate foothold within the Air Force.

Chapter 4 examines the first five years of the Eisenhower presidency. National interest in missiles and the emerging potential of space nourishes the aerospace concept significantly, and boosts its penetration within the Air Force. At the same time, however, the Eisenhower administration, driven by cold war dynamics, begins to fashion a perspective that deliberately holds space as a separate place. The chapter closes at the eve of the Soviet Union's launch of *Sputnik* in October 1957.

The *Sputnik* event—or more specifically, the reactions it generated—is so central to this story that all of chapter 5 is focused on the single year that followed in its wake. The world's first satellite launch catalyzed a myriad of forces both encouraging and discouraging to the aerospace concept's institutionalization. By the year's end, the word "aerospace" had emerged and the concept had become an official position of the Air Force. However, a national space policy had also appeared that sought to keep space a "peaceful" place and cordoned off, largely, from military exploitation.

Chapter 6 explores the final two years of the Eisenhower presidency during which the threads from the previous year further develop and solidify. On the one hand, this period saw the aerospace concept garner enormous exposure and make significant inroads penetrating more deeply into the Air Force. On the other, however, as Eisenhower's space policy (and the implications it entailed) gained traction, the environment around the Air Force grew increasingly discouraging to the concept's development.

Kennedy's election in November 1960 suggested a new president might usher in a more militarily aggressive policy for space, and the initial months of his presidency seemed to confirm that. However, chapter 7 describes how cold war realities brought Kennedy to adopt the path of his predecessor. It also examines a corresponding ascendancy within the Air Force of an air and space perspective, confirmed by the organizational structures within and the political environment without, that challenged and secured some of the ideational terrain that the aerospace concept had occupied. By the end of the Kennedy administration, environmental and internal factors together arrest the aerospace concept's institutional momentum. The study's historical narration ends with a short epilogue describing how the dynamics that affected the study's outcome, discernable from the time Johnson assumes the presidency, have remained largely unchanged ever since.

An analysis of this history, presented in chapter 8, brings into focus the dissertation's key findings. First, recognizing the aerospace concept as an idea that has been only partially institutionalized with respect to the Air Force best explains how the service can espouse the idea for so long but not come to embody it. The approach also reveals the factors responsible for perpetuating this condition. The concept's persistence appears to be due primarily to its inherent consistency with the intellectual theory around which the Air Force is built. Compounding this persistence has also been the tacit support of recurring generations of the service's corporate leadership, who have embraced the idea for its rhetorical value in capturing the Air Force's perceived realm of responsibility. However, while these forces have been enough to keep the concept alive, they have not been enough on their own to push the idea to a fully institutionalized state.

Aerospace fails to "stick" primarily because it remains in constant competition with an alternative air and space perspective, established intentionally by national policy long ago, and perpetuated since through external organizations and law designed to maintain and reinforce that perspective. Moreover, because the Air Force is subject to and influenced by this environment, the perspective has leaked into its own organization as well. The technologies the service has been authorized to pursue and the organizations it has needed to support these technologies have also taken on an air and space character. In a general sense, all of these conditions were present and largely static by the end of the Kennedy presidency, and they remain in place today.

However, as a study more broadly interested in the process through which ideas embed within organizations, this story's particular outcome is less important than its general unfolding. Beyond the Air Force and its aerospace concept, this research highlights a process that is both dynamic and complex. In so doing, the story also underscores the value of using institutionalization process models to help better understand it.

LIMITATIONS

Before moving into its main body, there are three limitations inherent in this thesis that merit mention. Two of them are more obvious than the third, but all significantly qualify its conclusions.

The first is methodological. Ideas and institutions are abstractions, whereas organizations have form. Yet, all three are social artifacts—things constructed, embraced, and perpetuated by people. Consequently, in analyzing the development of the aerospace concept as an organizational idea undergoing the process of institutionalization, this study plies wholly social phenomena that are by their nature complex and contextually dependent. It also means that the knowledge this study builds is bound necessarily by that context and therefore is inescapably contingent. In other words, this is a *qualitative* research project that seeks insight and understanding, but cannot offer proof.[14]

The second concerns the limitations this study faces due to the expanse of time it covers. While an historical explanatory dissertation allows the flexibility to span a broad range of issues, nevertheless, coursing twenty years of history demands unwavering focus and a judicious use of the scalpel.[15] Consequently, this study accepts that whatever explanatory power it sacrifices by treading thinly over many areas, it gains in breadth.

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[14] For a thorough and insightful discussion on qualitative versus quantitative research methodology see James A. Anderson, *Communication Research: Issues and Methods* (New York: McGraw-Hill Publishing Company, 1987), chapters 1 and 2. The discussion here is drawn from pp. 45-7 in particular.

[15] Stephen Van Evera describes the historical explanatory dissertation as one of seven different models of political science dissertations. His description reads: "A *historical explanatory* dissertation uses theory (academically recognized theory, folk theory, or 'common sense' deduction) to explain the causes, pattern, or consequences of historical cases." Stephen Van Evera, *Guide to Methods for Students of Political Science* (Ithaca, N.Y.: Cornell University Press, 1997), 91.

The final qualifier is less obvious and is drawn from Harvard historian Frederick Merk's warning not to "overemphasize the 'idea' in history." To paraphrase Merk in the context of this thesis, pulling the development of the aerospace concept out of history in retrospective analysis tends to make the concept "loom larger" than it actually was. This problem, cautions Merk, is particularly troublesome given how "the 'idea' as tenuous as" the concept of aerospace has existed during this period in history.[16] The fact that the aerospace concept didn't acquire its name until fourteen years after its birth, and has rarely since been an idea that airmen have felt a need to defend, makes Merk's warning significant. To deter, as much as possible, this inherent bias from entering the study, an uncharacteristically high value was placed on capturing a more complete *zeitgeist* than might normally be considered necessary. The success achieved or not in this regard will no doubt be a central issue of critique.

The shelves are filled with histories that capture the evolution of relevant technologies, detail the specific experiences, or analyze the particularly influential decisions that led man into space.[17] Significantly, however, none question how space developed *conceptually*. Nor do any address the intriguing disparity between the American airman's view of the world and that of its soldiers, sailors and leaders.

Perceptions, however, determine actions. How we think about the world around us influences directly how we choose to act upon it. This is as true of individuals as it is of

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[16] Frederik Merk, *Manifest Destiny and Mission in American History* (New York: Vintage Books, 1966), 225.

[17] See for example, Walter A. McDougall, *…the Heavens and the Earth: A Political History of the Space Age,* (New York: Basic Books, 1985; Baltimore: The Johns Hopkins University Press, 1997), William E. Burrows, *This New Ocean: The Story of the First Space* Age (New York: Random House, 1998), Philip Taubman, *Secret Empire: Eisenhower, the CIA, and the Hidden Story of America's Space Espionage* (New York, NY: Simon & Schuster, 2003), Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-84,* (Ithaca, NY: Cornell University Press, 1985), Walt Whitman Rostow, *Open Skies: Eisenhower's Proposal of July 21, 1955,* (Austin: University of Texas Press, 1982), to name but a few.

the organizations we collectively create. "Ideas matter," argue Peter Trubowitz and Edward Rhodes, "and not simply because they shape threat perceptions, limit the range of conceivable options, focus attention on particular options, and determine how costs and benefits will be evaluated…. State institutions…are capable of actively participating in the struggle to define and control the intellectual terrain of national strategic choice."[18]

Tracing the development of the aerospace concept through the lens of institutionalist theory adds depth to the historical record. It also offers the Air Force a better understanding of an organizational identity issue with which it is currently grappling. But most importantly, this study expands and empowers our understanding of the important relationship between organizations and the ideas they come to hold. The case supporting these statements is presented in the pages that follow. If these pages also serve, if only slightly, to attenuate a tension that has long existed in this particular "intellectual terrain of national strategic choice," then this study will have exceeded its grandest expectations.

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[18] Peter Trubowitz and Edward Rhodes, "Explaining American Strategic Adjustment," in Peter Trubowitz, Emily O. Goldman, and Edward Rhodes, eds. *The Politics of Strategic Adjustment: Ideas, Institutions, and Interests* (New York: Columbia University Press, 1999), 20.

Chapter 2

Theory and Methodology

To wade into history and extract from it the story of how the aerospace concept developed within the Air Force, this dissertation turns to the field of institutionalism. More specifically, from institutionalism, this study draws upon and synthesizes two independently derived models that describe how institutions develop within organizations. The connection between these theories and the history it helps to explain, however, demands clarification.

Four basic questions will guide this chapter's discussion. Why institutionalism? Where within the field of institutionalism does this study rest? What theories specifically does it draw upon? And finally, how are they employed to help analyze the aerospace concept's history? The answer to the first question will argue institutionalism's relevance to this project and present the definitions it stands upon which makes this argument valid. Discussion from the second will open with a description of institutionalism's broad landscape and then it will locate this study within it. With the third question discussion narrows in on the two institutionalization process models this study employs and makes the case that though these models emerge from totally disparate backgrounds within the field, they in fact complement each other nicely. Finally, the discussion will conclude by describing how this study synthesizes these two models and how it uses the result to construct and analyze the history of the aerospace concept.

WHY INSTITUTIONALISM?

The search for theory to help explain what gives ideas staying power within organizations can be a frustrating one. Clearly, ideas have long interested scholars—indeed some of history's greatest minds—and thus perspectives on them abound. Plato wrote extensively about their basic nature. Weber and Lippmann pondered their function. John Henry Newman wondered in the mid-nineteenth century how ideas change over time within religion. Thomas Kuhn did the same in the twentieth with regard to science. And others offer different notions about how ideas diffuse.[1] Frustratingly, however, there is little that speaks to how or why ideas *persist*, in general let alone within organizations. The theory of institutionalism is hardly different in this respect, as readers familiar with the field may have noted already. While its scholars certainly recognize ideas as influential in institution development, none have focused yet on ideas as institutions *per se*.[2]

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[1] Plato's theory of ideas has been extrapolated from surveys of his work. See for example Sir David Ross, *Plato's Theory of Ideas,* (Oxford: The Clarendon Press, 1951). Weber's and Lippmann's works have already been cited (see p. 3). Citations of other works mentioned here: John Henry Newman, *An Essay on the Development of Christian Doctrine* (1878; reprint, Garden City, N.Y.: Image Books, 1960), Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: Chicago University Press, 1962, 2nd ed., 1970). For works on diffusion see Everett M. Rogers, *Diffusion of Innovations* (New York: Free Press, 1962, 4th ed. 1995) and Susan Blackmore, *The Meme Machine* (New York: Oxford University Press, 1999), who takes an amoral approach to ideational diffusion through a Darwinian analysis.

[2] Kathryn Sikkink, in *Ideas and Institutions: Developmentalism in Argentina and Brazil* (Ithaca, N.Y.: Cornell University Press, 1991) comes the closest to doing so, and this study relies extensively on her work. But her concept of "idea" is much more sophisticated than is implied herein. The "idea" she evaluates is a detailed model for economic development that prescribes distinct and implementable actions. The idea that "air and space form a single continuum" is much more of an idea in the basic sense of the word than is the subject of Sikkink's analysis. Goldstein and Keohane's *Ideas and Foreign Policy* also approaches the study's area of interest. However, by their own admission on page four of their book, "we do not seek to explain the sources of …ideas; we focus on their effects." For other works that relate ideas to institutions see Peter Trubowitz, Emily O. Goldman, and Edward Rhodes, eds., *The Politics of Strategic*

Institutionalism's contribution to this project, however, stems less from its insight on ideas than its perspective on persistence. In what critics cite as one of the field's seminal pieces, Lynn G. Zucker argues explicitly that the institutionalization of cultural knowledge ensures its persistence within that culture. Furthermore, she writes that "institutionalization is not simply present or absent; …institutionalization is …variable, with different degrees of institutionalization altering the cultural persistence which can be expected."[3] In other words, Zucker suggests that the extent to which something persists within a given culture relates directly to the extent to which it is institutionalized within that culture. Moreover, this infers that institutionalization can be examined as a process variable, an insight that opened a new line of inquiry within the field to explicate further the details of this process.

Zucker's argument is thus crucial to this study's methodology in two respects. First, if one accepts the aerospace concept as something imbued with the potential to become an institution, then its degree of persistence within the Air Force will be reflected by the extent to which the Air Force has institutionalized it. Second, if such is the case, then theories that describe in more detail the institutionalization process offer legitimate vehicles with which to ply this study's fundamental research questions. Both of these points explain why this dissertation turned to the field of institutionalism for help. But the logic of this choice—and behind it, institutionalism theory's validity in this study—

Adjustment: Ideas, Institutions, and Interests (New York: Columbia University Press, 1999), and Peter A. Hall, ed., *The Political Power of Economic Ideas* (Princeton, N.J.: Princeton University Press, 1989).

[3] Lynne G. Zucker, "The Role of Institutionalization in Cultural Persistence," *American Sociological Review* 42 (October, 1977): 726. Cited as one of institutionalism's foundational articles in Walter W. Powell and Paul J. DiMaggio, eds., *The New Institutionalism in Organizational Analysis* (Chicago: The University of Chicago Press, 1991), chapter 1. Zucker's article reprinted therein as well, 83-107.

rests upon the premise that establishes it: that the aerospace concept is itself something that can become an institution.

The argument that "aerospace," as an idea, is indeed a legitimate candidate for institutionalization depends naturally upon how one defines "institution"—a decision particularly important given that so much ambiguity surrounds the term.[4] Moreover, the argument's credibility demands that the definition it relies upon be consistent with the one Zucker uses to reach her conclusions. Thus, this dissertation turns to the same source she has referred to often throughout her career-long interest in the field.

Definitions. Sociological phenomenologists Peter Berger and Thomas Luckmann, in their classic work *The Social Construction of Reality* (1966), describe an institution as a "reciprocal typification of habitualized actions."[5] Connecting this pithy definition to the claim that the aerospace concept is a legitimate institution candidate requires some explanation. However, doing so also affords the opportunity to recognize the tremendous utility this definition brings to this research.

By "habitualized actions" Berger and Luckmann mean behaviors that an actor or a group of actors have adopted over time to solve recurring problems. These behaviors become habitualized to the extent that actors evoke them with minimal decision-making effort. The "reciprocal typification" of these behaviors, then, denotes the gradual development of socially shared definitions or meanings that become linked to these

[4] Consider, for example, the myriad of things the *Oxford English Dictionary* says an institution can be: "an established law, custom, usage, practice, organization, or other element in the political or social life of a people."

[5] Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (Garden City, N.Y.: Doubleday & Company, Inc., 1966), 51.

actions of habit.[6] In other words, this study defines institution as the unquestioned meaning, developed within and shared among a group, that has become associated with (or that typifies) an oft-repeated problem-solving behavior. Indeed, in their fully developed form, institutions so defined appear to a group's actors "as given, unalterable, and self-evident."[7] For example, to the soldier, the salute is an institution. Not the act of bringing the hand crisply to the brow which solves the problem of how the subordinate and superior greet one another, but rather the unspoken and shared meaning of acknowledgment and mutual respect between them that the salute itself has come to embody.

The utility of this definition projects from the characteristics of institutions it implies. For the purposes of this research, there are two worth noting: institutions have objective histories, and more importantly, institutions control human action.

"Reverse typifications of habitualized actions" must have objective histories. Meanings do not attach to repeat actions instantaneously. They do so over time. These meanings also spread across people, diffusing both horizontally throughout a group and vertically through its successive generations. Thus, institutions necessarily "are experienced as existing over and beyond the individuals who 'happen to' embody them at the moment. …(They) are now experienced as possessing a reality of their own, a reality that confronts the individual as an external coercive fact."[8] The objective quality of an institution's developmental past is what opens its history to verifiable observation and

[6] Pamela S. Tolbert and Lynne G. Zucker, "The Institutionalization of Institutional Theory," in *Handbook of Organization Studies,* ed. Stewart R. Clyog, Cynthia Hardy, and Walter R. Nord (Thousand Oaks, Calif.: Sage Publications, 1996), 180.

[7] Berger and Luckmann, 56.

[8] Berger and Luckman, 55.

analysis. In other words, its objective history is what makes an institution's past ultimately researchable.

The second characteristic of Berger and Luckmann's definition—that institutions imply control—is important on two counts. For one, it sharpens the focus of this study's analysis. Berger and Luckmann write that "institutions… control human conduct by setting up predefined patterns of conduct, which channel it in one direction as against the many other directions that would theoretically be possible."[9] In other words, institutions drive behavior. Furthermore, this infers that the extent of an institution's infusion within a social group is observable in and relative to the consistency of behavior the social group exhibits with respect to it. Social behavior that over time aligns increasingly with a developing institution provides evidence of its increasing institutionalization. The opposite, of course, is also true. Thus, to discern an institution's developmental progress within an organization, one can evaluate organizational behavior over time for changing degrees of consistency with respect to that institution, which is precisely what this study will do with regard to the Air Force and its aerospace concept. But more important than focusing this study's analysis, Berger and Luckmann's recognition that institutions control human behavior in fact enables it. For this characteristic also supports the argument that the aerospace concept, though only an idea, is indeed a legitimate candidate for institutionalization.

There is a striking resemblance between Berger and Luckman's quote from the preceding paragraph and Weber's observation with respect to ideas (paraphrased in the

[9] Berger and Luckman, 52.

opening paragraph of this study—see p. 1). Here are both again; Weber's this time quoted directly:

Weber's perspective on ideas:

> Not ideas, but material and ideal interests, directly govern men's conduct. Yet very frequently, the 'world images' that have been created by 'ideas' have, like switchmen, determined the tracks along which action has been pushed by the dynamic of interest.[10]

Berger and Luckmann's on institutions:

> Institutions… control human conduct by setting up predefined patterns of conduct, which channel it in one direction as against the many other directions that would theoretically be possible.

Institutions, as Berger and Luckmann define them, arise from repeated actions, not from ideas. However, if one accepts that their institution and Weber's ideationally created 'world image' are each capable of channeling human behavior, then grounds exist to explore the possibility of a relationship between them. The danger of a *non sequitur* here is clear but the intent is not to equate institutions with ideas. Rather, it is to suggest that ideas which build 'world images' are themselves legitimate candidates for institutionalization within the broader framework of Berger and Luckmann's meaning of the term. A world image institutionalized to its fullest potential becomes an unquestioned perspective derived from the recurring problem of how members of a social group come to collectively visualize their environment. In this sense, for example, "all men are created equal" might be considered an idea institutionalized to a certain extent within the American system. Or, regarding this study's focus, to see air and space as the single environment of aerospace constitutes a simple 'world image' alternative that, if institutionalized within the Air Force, would channel organizational conduct down

[10] Weber, 280.

certain tracks and preclude it from others. Given that this action is observable, as is action inconsistent with the aerospace concept, then there exists a basis on which to test the suggestion.

Thus, to define institutions as "reverse typifications of habitualized actions" is tremendously useful from a methodological standpoint. It suggests that the aerospace concept, evaluated as a developing institution, can be traced through history because of its objectified history, and analyzed for its consequent influence upon Air Force behavior. Moreover, it implies that the intent to evaluate this idea as an institution-in-the-making is valid. Not only does Berger and Luckmann's definition thereby establish the foundation of this study's research design, it underscores its focus. Indeed, they argued, "it is impossible to understand (an) institution adequately without an understanding of the historical process in which it was produced."[11]

So, why institutionalism? Because certain theories within this field suggest that the degree to which something is institutionalized within a culture or social group accounts for the extent to which it persists within that group, because the field also offers explanations of how the institutionalization process occurs, and finally because these explanations are built upon a respected definition for institution that allows us to consider the aerospace concept as something with the potential to become one. Further discussion will examine these theories specifically, but before turning to the question of where within the body of institutionalism literature this study resides, one other term needs clarification.

[11] Berger and Luckmann, 52.

As has been mentioned already, "institution," notwithstanding how it is defined above, is a word that swims in ambiguity. Among its many meanings, it is often used interchangeably with the term "organization." These pages employ both words often, but never synonymously. There is value, therefore, in emphasizing further their distinction within this study.[12]

Herein the word "organization" is meant first in the classical Weberian sense. An organization is "an arrangement of interdependent parts, each having a special function with respect to the whole," whose members engage in activities and interpersonal transactions directed toward specified goals.[13] To this we add a more contemporary viewpoint to build upon this definition further.

The Open Systems perspective of organization theory infuses the classical viewpoint with the socio-biological insights of general systems theory. Open systems organizational theorists see organizations as "nested" social systems, comprised of subcomponents in the classical sense, but which themselves constitute components of still larger organizational systems.[14] The distinction open systems theorists draw over their classical counterparts is critical; they recognize that organizations both shape and are shaped by their environments.

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[12] Ronald L. Jepperson, in "Institutions, Institutional Effects, and Institutuionalism" (Powell and DiMaggio, chapter 6), argues broadly that "institution" so defined can indeed encompass "organization" as a legitimate example. In an abstract sense, this is a supportable position. However this study chooses to maintain an explicit separation between the two terms in order to avert any potential confusion.

[13] James G. March, ed., *Handbook of Organizations* (Chicago: Rand McNally & Company, 1965), 1. See also Nitin Nohria and Ranjay Gulati, "Firms and Their Environments," in *The Handbook of Economic Sociology,* ed. Neil J. Smelser and Richard Swedberg (Princeton, N.J.: Princeton University Press, 1994), 531.

[14] Nohria and Gulati, 537.

This study recognizes the Air Force as an organizational unit in the classical sense of the word, but analyzes it with an open systems perspective. The actions and decisions the Air Force engages in with respect to the aerospace concept are derived from within its organizational confines but are necessarily influenced by, and have influence upon its broader contextual environment. Furthermore, this environment is layered. As an organization, the Air Force exists coequally alongside the Army and the Navy, all of which are nested within a broader Department of Defense, which is part of a still-broader national security infrastructure. As this study will show, the organizational layers external to the Air Force, while not actively engaged in decision-making processes that affect the institutionalization of the aerospace concept *per se*, influence these decisions nevertheless and thus warrant attention.

Implicitly, these definitions establish the methodological foundation for this study. Defining "institution" as the unquestioned meaning, developed within and shared among a group, that has become associated with (or that typifies) an oft-repeated problem-solving behavior unlocks the door to institutionalism theory and its perspectives on cultural persistence. Recognizing "organizations" as permeable entities that interact beyond their traditional walls enhances further the explanatory power of institutionalism. Again, this study evaluates the Air Force as an organization—not an institution. Rather, the institution under analysis here is the aerospace concept, which from the outset is recognized only as an "institution-in-development." Locating where within the field of institutionalism this study resides is the next subject of discussion. Thereafter, the specific models this study employs will be introduced.

WHERE WITHIN INSTITUTIONALISM?

The boundaries of institutionalism theory are both extensive and porous. Scholars from across the social sciences have found themselves drawn to the explanatory power that institutions provide in the study of economic, political and social outcomes, which gives the field an attractive interdisciplinary quality, but also frustrates the development of consensus within its borders.[15] Because this study extends across some of these perspectives, there is value in describing institutionalism's varying landscape before identifying where within this landscape it actually sits. Two different typologies help toward this end.

Lynn Zucker differentiates institutionalism research based on its object of analysis. She reasons that research focused on the *effects* of institutions, because it tends to look across groups, societies, cultures or states, has a *macro* orientation. In other words, macro-level studies concentrate on how institutionalized environments influence behavior, but tend to treat institutions themselves as "black boxes." Equally important and complementary to this perspective, however, is the *micro*institutional approach, whose object is to open the box and understand the *process* through which institutions originate, develop, and persist. Without a microlevel foundation, argues Zucker, the field of institutionalism risks "focusing on content at the exclusion of developing a systematic explanatory theory of process …and neglecting institutional variation and persistence." [16]

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[15] Reviews of institutionalist literature almost universally comment upon these issues. From Walter W. Powell and Paul J. DiMaggio, eds., *The New Institutionalism in Organizational Analysis* (Chicago: The University of Chicago Press, 1991), 3. See also Robert Keohane, "International Institutions: Two Approaches," *International Studies Quarterly* 32 (1988): 379-96, Peter A. Hall and Rosemary C. R. Taylor, "Political Science and the Three New Institutionalisms," *Political Studies* XLIV, no.5 (December 1996): 936-57, and Tolbert and Zucker.

[16] Zucker discusses this typology in the postscript of Powell and DiMaggio's reprint of her 1977 article (postscript begins on page 103). Quote here from Powell and DiMaggio, 105. See also Paul Pierson,

Dissecting the field into effects-focused (macro) and process-focused (micro) research helps to organize it somewhat, but there still exists the problem of finding order among institutionalism's various academic sub-fields. Only a decade ago, organizational theorists Walter Powell and Paul DiMaggio identified institutionalism strands from economics, organization theory, political science, history, and sociology that are "united by little but a common skepticism toward atomistic accounts of social processes and a common conviction that institutional arrangements and social processes matter."[17] Many have since attempted to inject some continuity into the field by trying to connect and categorize its numerous perspectives. An effort that succeeds quite well in this respect is a framework advanced in 1996 by Peter Hall and Rosemary Taylor.

To provide a common reference point for the field of institutionalism and to encourage greater cross-pollinization among its academic subdivisions, Hall and Taylor simplify and categorize institutionalism's varying strands by comparing them against a spectrum that describes the motivation behind human behavior. Anchoring one end of this spectrum is the rational actor, or calculus model, which holds that individuals, in possession of a set of fixed preferences, act on the basis of strategic calculation in order to maximize the attainment of these preferences. At the spectrum's other end is the cultural model of behavior that adheres to relativistic explanations where context, bounded by an individual's worldview, supplies the primary motivation for human behavior. Viewed against this spectrum, Hall and Taylor find that three distinct and

Politics in Time: History, Institutions, and Social Analysis (Princeton, NJ: Princeton University Press, 2004), pages 103-66 in particular.

[17] Powell and DiMaggio, 3.

relatively independent schools of institutionalism have emerged over the last twenty years.[18]

The "Rational Choice School" of institutionalism gravitates toward the calculus model of human behavior. Grown primarily out of economics and political science, this school sees institutions as tools that help (or hinder) preference attainment. To a rational choice institutionalist, institutions tend to be formalized structures or norms that provide actors "greater or lesser degrees of certainty about the present and future behavior of other actors." This school argues that because institutions serve a value-maximizing function, they originate from voluntary agreements among relevant actors and persist over time relative to the gains they continue to provide; the more gains an institution brings, the stronger the institution will be.[19]

In contrast, the "Sociological School" of institutionalism favors cultural explanations for human behavior and approaches the study of institutions accordingly. This school has its roots in organization theory, sociology, and anthropology. It sees institutions more informally, as "moral or cognitive templates… that provide the 'frames of meaning' guiding human action." Sociological institutionalists tend to argue that institutions develop in order to enhance an organization's social legitimacy within its broader contextual environment. Accordingly, institutions persist (or change) in accordance with how effectively they continue to fulfill that role.[20]

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[18] Hall and Taylor, 937.

[19] Hall and Taylor, 939, 940, 945. For examples of rational choice institutionalists see: Kenneth Shepsle and Barry Weingast, "The Institutional Foundations of Committee Power," *American Political Science Review,* 81 (March 1987): 85-104; Stephen D. Krasner, "Westphalia and All That," in Goldstein and Keohane, 235-64; and Terry Moe, "The New Economics of Organization," *American Journal of Political Science,* 28 (1984): 739-77.

[20] Hall and Taylor, 939, 947, 949. For examples of sociological institutionalists see: John W. Meyer and Brian Rowan, "Institutionalized Organizations: Formal Structure as Myth and Ceremony,"

Hall and Taylor reserve the middle ground between for the "Historical School." Institutionalism scholars of this type are willing to draw eclectically from both the calculus and the cultural models of behavior and tend to cast the broadest net for what constitutes an institution. To this school, institutions can be both "the formal or informal procedures, routines, norms, and conventions embedded in organizational structure of the polity or political economy." Also distinguishing it from the others is the school's emphasis on path dependence and unintended consequences to help explain institution formation and persistence.[21] Historical institutionalists view causality as contextually dependent and emphasize contingencies in history. The historical perspective, for example, recognizes and gives credence to the "quirks of fate (that) are responsible for accidental combinations of factors that may nevertheless have lasting effects."[22] Consequently, they tend to view the role of institutions as part of a broader explanation for behavior and are more willing than the other schools to examine within their analyses the influence of beliefs and ideas.

Combining Hall and Taylor's typology with Zucker's, a two-dimensional framework of the field of institutionalism emerges. With it, we can see more clearly where within the field this study resides:

American Journal of Sociology, Volume 83, Issue 2 (September 1977): 340-63; Paul J. DiMaggio, and Walter W. Powell, "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review,* 48 (April 1983): 147-60; James March and Johan P. Olsen, *Rediscovering Institutions: the Organizational Basis of Politics* (New York: Free Press, 1989).

[21] Hall and Taylor, 938, 941-2.

[22] Ellen M. Immergut, "The Normative Roots of the New Institutionalism: Historical-Institutionalism and Comparative Policy Studies," in eds. Arthur Benz and Wolfgang Seibel, *Theorieentwicklung in der Politikwissenschaft: Eine Zwischenbilanz* (Baden-Baden: Nomos, 1997) (accessed 24 July 2002); available from http://www.uni-konstanz.de/FuF/Verwiss/Immergut/publications/kon3.htm. For other examples of historical institutionalists see: Richard M. Locke and Kathleen Thelen, "Apples and Oranges Revisited: Contextualized Comparisons and the Study of Comparative Labor Politics," *Politics and Society,* 23, 3

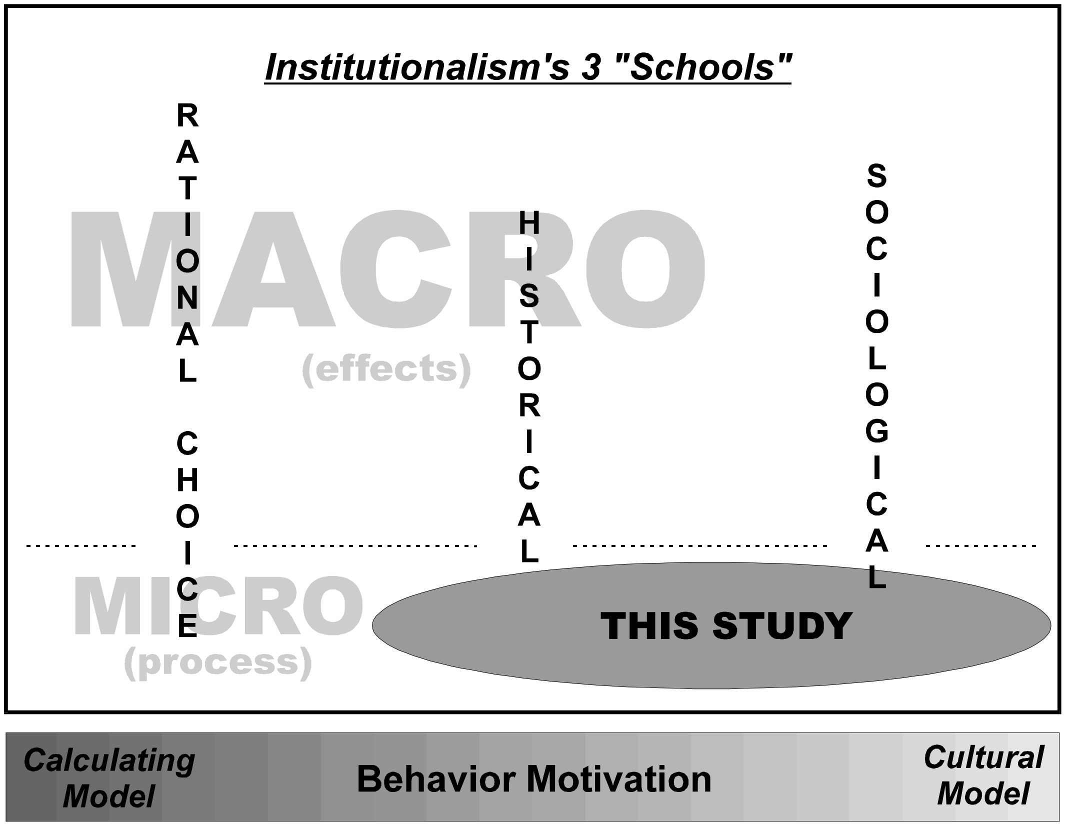

Figure 1 – Dissertation's Location within Institutionalism's Literature

In 1991, Zucker observed with some concern a strong imbalance within the field's literature favoring macro-level research.[23] A review of institutionalism's literature in the period since suggests this imbalance has not changed.[24] This dissertation, however, falls unquestionably within the microinstitutionalist realm because it applies process models of how institutions develop in order to evaluate the extent to which the aerospace concept

(September 1995): 337-67; Douglas C. North, *Institutions, Institutional Change, and Economic Performance* (New York: Cambridge University Press, 1990).

[23] See Powell and DiMaggio, 103-6.

[24] Pierson, 103.

has been institutionalized (or not) within the Air Force. As such, it represents a step toward alleviating the disparity.

With respect to Hall and Taylor's framework, however, this study is somewhat of a hybrid. The definitions chosen for this research emanate decidedly from the cultural model of human behavior and thus pull it toward a sociological perspective. Its basic methodology, though, is much more consistent with a historical school approach. An even stronger argument for positing this study in the middle ground between these two perspectives is that the framework around which it sorts and presents its data represents a synthesis of two independent microinstitutionalist studies, one drawn from each of these schools.

WHAT THEORIES SPECIFICALLY?

From the historical school this study employs Kathryn Sikkink's *Ideas and Institutions* (1990). For the sociological school perspective, it turns to a more recent effort of Zucker's, who, in collaboration with Pamela S. Tolbert, published an article in *The Handbook of Organization Studies* (1996), entitled "The Institutionalization of Institutional Theory." Both of these works offer models of the institutionalization process. Both, judging from their references, developed completely independent of the other. Yet interestingly, the models are similar enough to be complementary—so much so that by combining them, each model's strengths enhance the other's limitations.

Sikkink's Model. Sikkink traces and compares the institutionalization of development economic programs during the early 1960s in Argentina and Brazil. Defining these programs as "sets of ideas connected by a theory," she is concerned with how they became "consolidated" (or institutionalized) within the rules and practices of government.[25] Her work builds upon a foundation established by Peter Hall in *The Political Power of Economic Ideas* (1989). Hall focused on the later stages of institutional maturity, while Sikkink adds depth and perspective to the institutionalization process' intermediate stages.

Sikkink suggests that institutionalization progresses over three sequential phases, which she calls *adoption*, *implementation*, and *consolidation* (ref. Figure 2, p. 31). During *adoption*, new programs begin the process of institutionalization in the form of ideas of top policy makers responding "to what they perceive as constraints and opportunities in the international and domestic economic situation."[26] In the *implementation* phase, these program ideas embed within the organization, embodied, for example, in the organization's statement of purpose, its self-definition, and its training programs. This works in turn to perpetuate and instill them further into the organization.[27] *Consolidation* occurs as these program ideas take on an objective, interpreted meaning among a broader audience. As a program consolidates, the elite consensus it has enjoyed thus far begins to extend into a broad-based societal consensus. Indeed, Sikkink concludes with words not unlike Zucker's cited earlier, that "the

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[25] Kathryn Sikkink, *Ideas and Institutions: Developmentalism in Argentina and Brazil* (Ithaca, N.Y.: Cornell University Press, 1991), 1. Sikkink defines key terms differently than this study does. She does not differentiate, for example, between *institution* and *organization*. By institutions she means "established organizations *and* the rules and practices that govern how these organizations function internally and relate to one another and to society. The rules and practices governing these institutions can be formal (that is, embodied in laws and regulations) or informal and implicit," (p. 23, emphasis mine). Because she uses institution and organization interchangeably, Sikkink never refers to her model as an institutionalization process model. However, her underlying meaning for "consolidation" is wholly consistent with this study's interpretation of "institutionalization." She is studying how "sets of ideas connected by a theory" move from inception to a point where they acquire an objective and persistent meaning of their own (see pp. 251-55). For clarity's sake, then, the author has changed her wording, where required and appropriate, to make it consistent with terms used herein. In these translations, utmost care has been taken so as not to alter or lose her intended meaning.

[26] Sikkink, 26. See also Judith Goldstein, "The Impact of Ideas on Trade Policy: The Origins of U.S. Agricultural and Manufacturing Policy," *International Organization* 43 (1989): 71.

consolidation or *persistence* of a new idea depends on the *degree* of consensus that forms around it."[28] Below is Sikkink's model represented graphically for the purposes of this study.

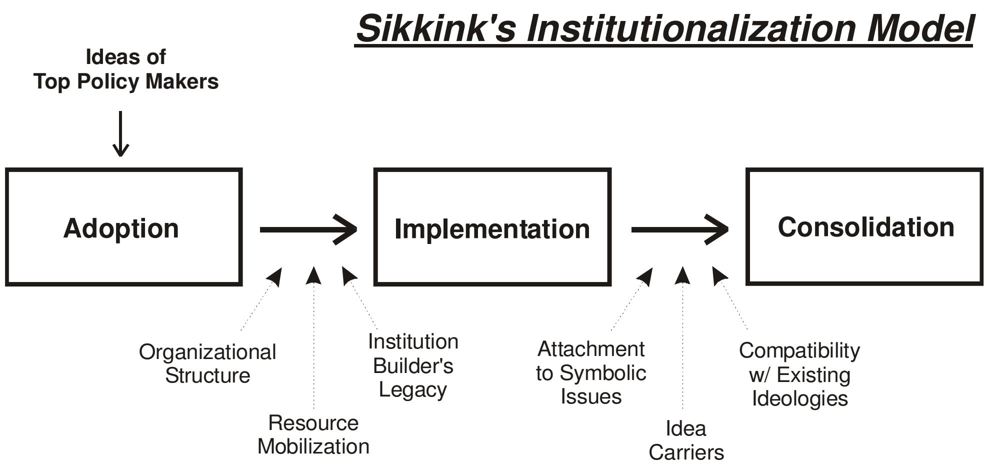

Figure 2 – Sikkink's Institutionalization Model

To account for progression within the institutionalization process, Sikkink identifies three factors that influence the movement of a developing institution from adoption to implementation and three that affect its further maturity toward consolidation. Early in the institutionalization process, she argues that organizational structure shapes the degree to which ideas become embodied within an organization. Within insulated bureaucracies, or where personnel continuity exists, ideas embed more easily. Ideas sharing an affinity with particular organizational sub-structures also take root more easily there than within other areas of the organization.[29] A second factor that affects an institution's early

[27] Sikkink, 2.

[28] Sikkink, 2, 255. Emphasis added.

[29] Sikkink, 24, 249.

development is the level and intensity with which organizational resources—financial, technical, and political—are mobilized to support it.[30] Finally, and key, is the role of pivotal institution builders and their ideational legacy. This legacy can be incorporated into policy, training programs, or even the organization's ethos. "But," Sikkink observes, "once ideas have become embedded within [organizations], they no longer require the presence of the founding individual to maintain their vigor."[31]

Similarly, Sikkink identifies three factors that influence a developing institution's movement from implementation to consolidation. First, the broad social consensus that develops around a maturing institution as it becomes consolidated does so largely through indirect attachments between its larger audience and an idea's origins.[32] Thus, the social meanings that emerge when an idea becomes wedded to issues of strong symbolic significance are important. Furthermore, these attachments can have a positive or a negative influence on the institutionalization process.[33] Sikkink also observes that these "reverse typifications," as Berger and Luckmann would call them, continue to be influenced by the individuals and organizations—the idea carriers—responsible for interpreting and propagating them. Finally, the political and ideological context into which the new idea is inserted plays a crucial role in determining how well an idea becomes consolidated, or fully institutionalized. In her comparative study of the institutionalization of development economics in Argentina and Brazil, Sikkink found

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[30] Sikkink, 207.

[31] Sikkink, 250. Again, for reasons explained in footnote 25 (p. 30) "organizations" replaces the term "institutions."

[32] Sikkink, 252.

[33] Simply to illustrate the concept, an example of an attachment having a negative influence appears in the argument that the institutionalization of equal rights for women within American society has been hampered of late by its symbolic attachment with the modern feminist movement. See, Christina Hoff

evidence to support Peter Hall's conclusion that the full consolidation of a program of ideas often rests upon "the nature of the political and ideological context into which (it is) introduced."[34] A program that fits well with existing ideologies stands a much better chance of reaching full institutionalization than one that doesn't.

In sum, Sikkink's subject matter, methodology, and findings, from an institutionalist's standpoint, identify her as clearly from the historical perspective. She observes and ascertains the reasons why the developmentalist ideology established itself far more successfully within the Brazilian political landscape than the Argentinean. Then she develops a model that describes how the institutionalization process generally occurred. The strength of this methodology—typical of the historical school approach—lies in its ability to incorporate detail. Theory induced from empirical, verifiable data tends to be strong on specificity, but it also tends to be contingent.

Sikkink concentrates her focus on interactions *within* governments. Consequently, the strength of her model is its recognition of particular institutionalization mechanisms that are internal to an organization. Organizational structure, resource allocation, and leadership are the factors, she argues, that propel an innovative idea to embed within an organization. An organization's contextual environment is introduced only in the later stages of her process model, when an institution's compatibility with the ideological context becomes critical to it reaching full consolidation. But the environment, at least where the aerospace concept's institutional development is concerned, appears to have played a role from the beginning. Without the evolution, *outside the Air Force,* of a

Sommers, *Who Stole Feminism?: How Women Have Betrayed Women* (New York: Simon and Schuster, 1994).

[34] Sikkink, 21. This point is also made in Hall, *The Political Power of Economic Ideas,* 370.

technological capacity to reach space, the aerospace concept has no birth. Without a competitive push from the Army and the Navy who also indicated a desire to reach toward the high ground, the Air Force's interest in space may likely have been much slower to materialize. Without a Cold War, the Air Force would have been significantly less encouraged to look outward beyond the atmosphere. Thus, for the purposes of this study, Sikkink's model is helpful, but incomplete because it fails to recognize sufficiently, especially early in the institutionalization process, the apparent influence of factors external to an organization. To help alleviate this shortcoming, this study incorporates a sociological school perspective on the institutionalization process as well.

Tolbert and Zucker's Model. In contrast to Sikkink's historical approach, Tolbert and Zucker's model of the institutionalization process represents a deductive effort. Instead of being developed directly from empirical data, they build a hypothetical framework deduced from an extensive review of sociological institutionalist literature. They draw directly from Berger and Luckmann's definition of "institution" and a reservoir of sociological studies to piece together an institutionalization process model that is wholly reflective of the sociological perspective. Interestingly, however, despite having no apparent connection to Sikkink's work—neither Sikkink nor any of her secondary sources appear in Tolbert and Zucker's extensive bibliography, and visa versa—there are striking similarities between the two. This is a significant observation given the consensus problems mentioned earlier that confront the institutionalism field. Establishing such links among findings from disparate perspectives across the field adds credibility to their findings individually, and brings a modicum of synthesis to an interdisciplinary field of study that suffers from lack of cohesion.

Like Sikkink, Tolbert and Zucker subdivide the institutionalization process into three sequential phases (ref. Figure 3, p. 37). And while they label their phases using terms consistent with Berger and Luckmann's terminology, their characterizations of them are to a large extent compatible with Sikkink's. In this model, the institutionalization process breaks down into the *habitualization, objectification*, and *sedimentation* phases.

Habitualization begins when an organization adopts an innovative solution to an environmentally stimulated and recurring problem. During this phase, organizations generate new structural arrangements in accordance with the innovation and formalize these arrangements within the organization's policies and procedures. Tolbert and Zucker characterize habitualization as a period of pre-institutionalization where "there is no consensus yet on the general utility of the innovation."[35] Sikkink would see this phase as encompassing adoption and perhaps extending partially into her implementation phase.

During *objectification*, shared social meanings begin to develop and attach to the organizational structures, policies, and procedures generated in the habitualization phase. In other words, this phase marks the first appearance within the organization of reciprocal typifications with respect to the adopted institution. Within objectification, the emergent institution becomes more widespread within the organization. This "involves the development of some degree of social consensus among organizational decision-makers concerning the value of (the innovation) and increasing adoption by organizations on the basis of that consensus."[36] Interestingly, Sikkink's language describing her consolidation phase was similar: "In order for the model to become consolidated, or to persist, an elite

[35] Tolbert and Zucker, 181.

[36] Tolbert and Zucker, 182.

consensus and broad-based societal consensus had to emerge around it."[37] Thus, both models recognize that institutionalization involves consensus development that begins among organizational decision-makers and then spreads more broadly into the organization. Tolbert and Zucker stop short of extending their objectification phase, though, to a point that Sikkink would recognize as consolidation. Instead, they distinguish this second phase from their third by noting that despite the fact that structures at this stage have "acquired some degree of normative acceptance, adopters nonetheless are apt to remain cognizant of their relatively untested quality, and (thus still will) consciously monitor the accumulation of evidence on the effectiveness of the innovation."[38]

Tolbert and Zucker suggest that this conscious monitoring of a developing institution dies off within an organization in the final phase of their process model. *Sedimentation*, or full institutionalization, is at hand when the reciprocal typifications initiated during objectification mature to a point where, as Berger and Luckmann also put it, they are "experienced as possessing a reality of their own, a reality that confronts the individual as an external and coercive fact."[39] Or, as Sikkink would say, an objective meaning supported by a broad-based consensus exists around it. Sedimentation is characterized by the institution's horizontal spread across and beyond the organization as well as its vertical extension through successive generations of organizational personnel.[40]

[37] Sikkink, 2.

[38] Tolbert and Zucker, 183-4.

[39] Berger and Luckmann, 58, as cited in Tolbert and Zucker, 181.

[40] Tolbert and Zucker, 184.

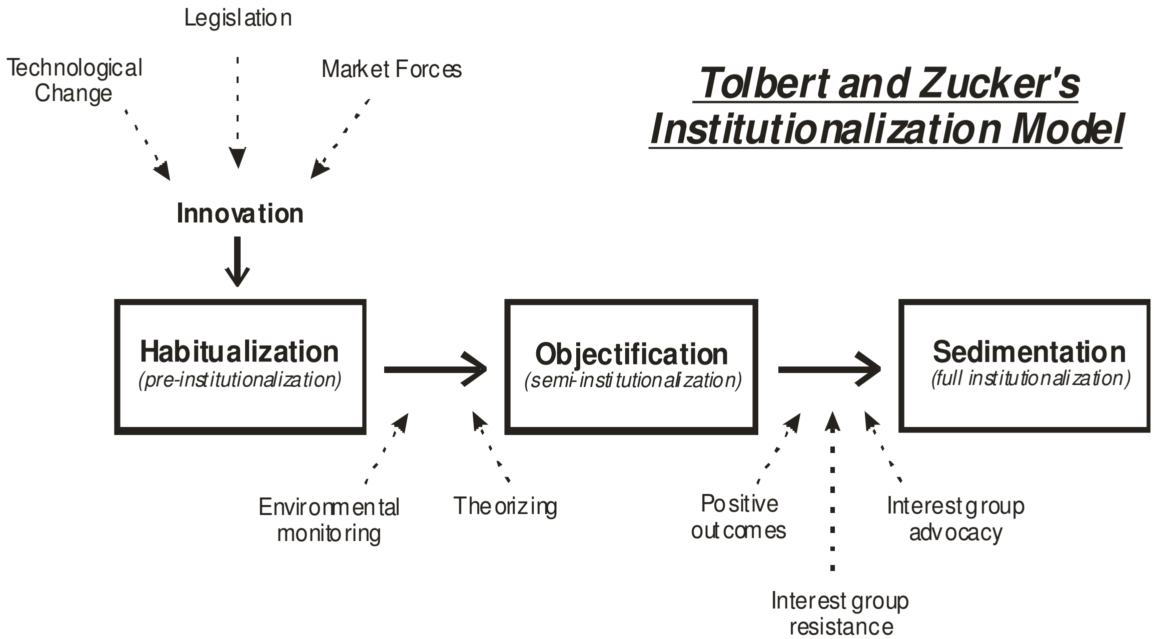

Figure 3 – Tolbert and Zucker's Institutionalization Model

Like Sikkink, Tolbert and Zucker describe a number of factors that account for the movement of institutions through their model, but unlike Sikkink, they recognize as well that an organization's contextual environment helps shape the process throughout. Indeed, Tolbert and Zucker credit external factors from the very beginning, citing changing technologies, legislative developments, and market dynamics as driving the innovations that initiate the institutionalization process.

As an emerging institution progresses from habitualization to objectification, two mechanisms affect the consensus among an organization's decision-makers that develops around it. One is environmental, the other internal. On the one hand, organizational decision-makers look outward for feedback to reevaluate continually the risks they incur from adopting an innovation.[41] What is the competition doing? How is the public reacting? Positive environmental assessments build consensus; negative ones erode it. On the other hand, decision-makers focus inward during this phase to engage in "theorizing," spearheaded often by a "champion," or strong proponent of the innovation. Theorizing entails two major tasks: defining the problem clearly enough to "generate public recognition of a consistent pattern of dissatisfaction or organizational failing;" and developing theories that justify the adopted solution as the proper one. Effective theorizing provides persuasive evidence to the organization at large that the adopted innovations have and will continue to prove successful.[42] Environmental validation and internal justification thus combine to build consensus around a developing institution as it migrates into and through the objectification phase.

Influencing the institution's movement from objectification to sedimentation, Tolbert and Zucker cite three additional factors. Like Sikkink's "idea carriers," they too note the positive influence that advocacy groups favorable to the developing institution can have on the process. They go further, however, to point out that these groups form in order to counter resistance from alternative interest groups who oppose the institution, either from within or outside the organization. Naturally, the sum effectiveness of these forces serves to either propagate or truncate the institutionalization process. Finally, even without the influence of advocacy groups, there remains the effect of the institution's continued usefulness. Conscious monitoring of an institution can die off only if the institution

[41] Tolbert and Zucker, 182.

[42] Tolbert and Zucker, 183.

consistently generates positive outcomes with respect to the problem it was originally designed to alleviate.[43]

Tolbert and Zucker's institutionalization process model represents a broad synthesis of previous work from within the sociological school of institutionalism. Consequently, inherent in the effort is a strong bias toward cultural explanations for human behavior that emphasize the influence of the contextual environment on the development of institutions. In their model, context plays an important role throughout the process. But as well, one notes less detail where factors internal to an organization are concerned.

Despite their differences, Sikkink's perspective of how institutions form is remarkably similar in design and character to Tolbert and Zucker's. Both describe a process that occurs over time, both suggest variability in the levels of institutionalization, and both capture this variation in similar fashion. Each of their three phases equates roughly with the other's and the two models share significant consistency among the mechanisms they ascribe to this process. They each recognize the importance of leadership, organizational structure, and ideational legacy in an institution's development. Indeed, the commonalities between them are compelling enough to suggest that when these two models are combined, their differences—largely reflective of their inherent biases—in fact complement each other nicely. Sikkink's historical institutionalist perspective brings depth to the internal functions of organization that influence institution development. Tolbert and Zucker's sociological perspective adds breadth by accentuating the environmental effects on the process. In sum, when both are pulled together into a single model, a more balanced and comprehensive perspective of the

[43] Tolbert and Zucker, 184.

institutionalization process emerges. This is good news for a body of theory that struggles to find consensus within its borders. But it is even better news for understanding why on the one hand the aerospace concept persists within the Air Force, but on the other, fails to stick. Fusing Sikkink's work with Tolbert and Zucker's gives this study the analytical framework it needs to address these questions effectively.

HOW INSTITUTIONALISM?

Through the lens of microinstitutionalism theory, this study's two motivating questions—*why does the aerospace concept persist?* and conversely, *what keeps it from sticking?*—simplify into a single question of degree. The broad initial answer this theory suggests is that the aerospace concept persists because, to a degree, it has become institutionalized within the Air Force, but does not fully embed because it is not institutionalized enough. From this frame of reference, the issue then is to discern where within the institutionalization process the concept has stalled, and to figure out what caused this to occur.

Sikkink's model merged with Tolbert and Zucker's, forms a well-balanced net with which to wade into the pool of historical data that surrounds this issue. A three-phased institutionalization process constitutes its framework, the factors which influence this process its webbing. And when cast backward into history, this net will cull the relevant data and help organize this data to answer more completely this study's research questions.

The framework of the model that emerges suggests that the aerospace concept will develop as an institution in three progressive stages, each differentiated from the other by evidence within the Air Force of a broader and deeper consensus behind it. This consensus will begin at the highest levels of Air Force leadership and seep downward into the service from there. Bringing the two models together, a synthesized description of each of these phases follows. Because, like Tolbert and Zucker, this study employs the Berger and Luckmann definition for institution, for consistency it also adopts their terminology:

> *Habitualization* – characterized by no to little consensus. Top-policy makers adopt an innovation, then generate and formalize structural arrangements within the organization to begin implementing it. The developing institution starts to embed.
>
> *Objectification* – characterized by an increased consensus at lower levels of organizational decision-makers but short of unquestioned acceptance throughout. The developing institution embeds more deeply into the organization but the conscious monitoring of its effectiveness keeps organizational members cognizant of its un-tested quality.
>
> *Sedimentation* – characterized by complete elite and societal consensus around the institution. Generally unquestioned acceptance gives the institution an objective reality of its own. It becomes fully embedded within and embodied by the organization.

From the outset it is clear that this study's historical focus finds itself oriented within the first two phases described above. The aerospace concept has never been accepted within the Air Force as an unquestioned, objective reality. Thus, this study concentrates on the factors that influence the institutionalization process during habitualization and objectification only. Attention to the sedimentation phase is important only insofar as it suggests prescriptively where the aerospace concept might be headed at some point in the future.

To trace and understand the aerospace concept's institutional development, this dissertation observes eight different factors (or independent variables) influential to it. Like the phase descriptions above, these too are derived from both Sikkink's, and Tolbert and Zucker's models. However, this study departs from the original models somewhat on two counts.

First, factors internal to an organization affect the institutionalization process differently than factors external to it. Thus, unlike its forbearers, this hybrid model differentiates between these factors explicitly. Internal variables represent organizational behaviors the Air Force can control. They influence the aerospace concept's institutionalization *directly*, and they provide evidence at any point in the concept's history to establish the degree of institutionalization the idea has achieved within the Air Force. Environmental variables, on the other hand, are beyond the service's control. They broadly describe the Air Force's relevant exo-organizational context, but as such, only *indirectly* influence the concept's institutional development.

Secondly, unlike what the microinstitutionalism models it draws from suggest, this study monitors and evaluates all eight variables from the outset. Both Sikkink's and Tolbert and Zucker's models imply that certain factors initiate the institutionalization process while others affect it later on. However, technologies that may spark institutional development are sometimes made obsolete by new technologies, or market forces shift, or new administrations usher in new legislation and policy. Naturally, such changes can influence institutionalization no matter what phase of the process it is in. The same goes for internal variables as well. Organizational decisions within the Air Force will be sensitive to and influenced by changing externalities. New administrations bring in new security perspectives to which the Air Force must adapt, etc. Consequently, this study monitors all eight of its variables from beginning to end.

Having explained the difference between environmental and internal variables, and that each will be evaluated throughout this study's historical timeframe, it is appropriate now to introduce them (and indicate the original model from which they were drawn).

INTERNAL VARIABLES.

1) ***Leadership Focus.*** The focus of senior Air Force leadership *empowers* the aerospace concept's institutional development. Here the study looks for leadership vision, long-range planning and strategy, Air Force priorities, policy, staff studies involving aerospace related issues, etc. The intent is to assess when, how, and to what extent Air Force leadership focuses its attention and support on the concept and to look for relative relationships against the myriad of other issues that also demand senior leadership attention. *(Derived from Sikkink's "Institution Builder's Legacy" factor)*

2) ***Theorizing.*** Theory *justifies* the aerospace concept's institutional development. The intellectual arguments that support the evolving development and maintenance of the Air Force itself must support as well a concept behind which the organization officially stands. Consequently, this study examines academic papers, service doctrine, organizational studies, professional articles, white papers, and books concerned not only with the concept itself, but also with the development of air power theory in general. *(Derived from Tolbert and Zucker's "Theorizing" factor)*

3) ***Resource Mobilization.*** Resources *enable* the aerospace concept's institutional development. Here the study examines the technology programs, research and development priorities, and budget allotments that the Air Force apportions in support of the concept. It also looks for the relative weight these resources garner against the Air Force's broader resource requirements. *(Derived from Sikkink's "Resource Mobilization" factor)*

4) ***Organizational Structure.*** Organizational structure *perpetuates and percolates* the aerospace concept's institutional development. Here research examines organizational designs, restructuring decisions, nomenclature, and purpose for evidence of structural arrangements which nurture and support the aerospace concept. *(Derived from Sikkink's "Organizational Structure" factor)*

ENVIRONMENTAL VARIABLES.

5) ***International Security Climate.*** Here the intent is to capture the issues and tensions within the geopolitical context that drive American response, action, and adaptation. This factor influences security policy development and the character of America's military force structure. *(Derived in part from Tolbert and Zucker's "Legislation" factor, and in part from their "Market Forces" factor)*

6) ***Relevant National Policies***. National policy is a primary environmental determinant of the Air Force's internal decisions and actions. This study examines policy that is relevant to the aerospace concept's development. Particularly close attention is paid to the emergence of national space policy—its origins, changes, and continuities, and the underlying issues that drove its essential character. *(Derived from Tolbert and Zucker's "Legislation" factor)*

7) ***Interagency Competitive Climate***. Here the study examines interests external to the Air Force but against which the aerospace concept must compete directly. The intent is to capture the interservice and interagency tensions within the Department of Defense that vie with each other for national resources and political support. *(Derived in part from Tolbert and Zucker's "Environmental Monitoring" factor, and in part from their "Market Forces" factor)*

8) ***General Technology Environment***. With this contextual factor the study accounts for technology advancements *external* to the Air Force. It looks for the timing and nature of developments that enable or affect the general ability to operate in the domain of space and/or aerospace. *(Derived from Tolbert and Zucker's "Technological Change" factor)*

This study will monitor each of these eight variables throughout the aerospace concept's developmental history. From this, a dynamic picture of the concept's transition through the institutionalization process will emerge. The method will highlight those factors that motivated this process and those that discouraged it. It will indicate the effect and magnitude of these influences, and show how they varied over time. The method will highlight where within the process the concept's institutionalization stalled. And most importantly, it will indicate why this occurred.

In summary, this chapter has argued that a sociology-based definition of institution, which suggests that the aerospace concept can be considered as one, is what empowers this dissertation's methodology. Further enabling it is the notion that the degree of institutionalization indicates the degree of an institution's cultural persistence. From these foundations, the study employs a hybrid microinstitutionalist process model, fused from disparate perspectives within institutionalism's field, to frame and organize its data. The model proposes eight different factors that influenced the aerospace concept's development as an institution. Examining them for variation over time will highlight the factors that encouraged, and those that discouraged the concept's progress toward full institutionalization. Encouraging factors will combine to explain, then, why the aerospace concept persists. Likewise, discouraging factors will together account for the concept's failure to stick. Thus, this chapter has charted a methodological course that will drive the dissertation toward answers to its primary research questions. With that, the discussion now turns toward its vessel.

To understand the development of the aerospace concept, Berger and Luckmann argued, one must understand the historical process that produced it. In that spirit, the survey that now follows opens at a point in time where an aerospace *perspective* first emerged.

Chapter 3

A Concept Born
(Early Habitualization, 1944-52)

> *The first missile powers contemplate space with the perspective of the first oceanic naval powers, when they contemplated the globe. Their existing legal and political conceptions do not cover it, and their experience provides them only with analogies. They can have little notion of the problems to which it will give rise, or of the political, strategic and economic importance it will have for them. It is not even clear what it is, or what the human activities are that will be specially connected with it.*
>
> —Hedley Bull,
> *The Control of the Arms Race* (1961)

When the term "aerospace" first appeared in 1958, it only described in a word what leading airmen had already long been thinking. Indeed, the concept that air and space is one was evident within the Air Force even before it became an independent service in the summer of 1947.[1]

America's leading aviators began to visualize their operational domain as extending beyond the atmosphere coincident with a growing awareness of rocketry's potential. This simple worldview, however, came not from an Air Force desire to reach space *per se*. Rather, it rose from a desire to expand the capability of air power. In other words, as

[1] For clarity's sake, this study takes some liberty with the term "Air Force." This caveat is relevant where events and issues that occurred before the National Security Act of 1947 are concerned. Where it is significant to distinguish between the multiple iterations America's air arm saw between 1938 and 1947—the Army Air Service, the Army Air Corps, the Army Air Force, and the United States Air

rockets first began to show promise of propelling man beyond the confines of the atmosphere, so too came the visions and ideas of America's airmen—justified within the constructs of air power theory—for how to best harness these emerging technologies. And the frame of reference within which these visions emerged was the implicit, if yet unnamed, notion of aerospace.

This chapter explores the earliest period of the concept's development, from its inception in the fall of 1944 to the end of 1952, when, after having weathered a phase of organizational neglect, the idea stood poised to establish a reasonably secure foothold within the Air Force. In terms of the institutionalization process model this study uses, the discussion herein will explore the early phases of the aerospace concept's habitualization. During this period, senior leaders within the Air Force came to adopt one man's perspective and in so doing began to establish organizational structure through which this perspective would further penetrate the organization. Examining the details of this process also makes clear that from the beginning a variety of other factors also influenced it. Within the Air Force, leadership focus, resource mobilization, and theoretical justification all played a direct role in the concept's early tendency to embed. But surrounding this activity was an environmental context outside the Air Force of subtle and not so subtle forces. An emerging cold war, technological advancements, and most importantly, interservice competition also significantly shaped how this story unfolds. To capture and understand all of these influences, we begin by returning to the closing year of World War II.

Force—this study does so. Where it is not, however, "Air Force" is used for clarity, although the name might not be historically consistent with organizational nomenclature for the time.

AEROSPACE NASCENCY (1944-46)

The *fons et origo* of the aerospace concept lies in the extraordinary vision of General Henry "Hap" Arnold, which he imparted indelibly to the Air Force during his final fifteen months of service as the Commanding General of the Army Air Forces (AAF). Conceived in the fall of 1944, and gestated thereafter in four actions Arnold took prior to his retirement in February 1946, the concept was born through a series of Air Force decisions taken during the remainder of that year. Interestingly, even during its embryonic period, various factors of the institutionalization process model were influencing the idea's development.

CONCEPTION

Hearsay evidence of the aerospace concept's earliest inklings first appear on 12 September 1944 within a quiet meeting that took place in the back seat of an Air Force staff car parked at the end of a runway at New York's La Guardia Airport. Therein sat General Arnold with one of America's leading scientists, Dr. Theodore von Kármán.

The two men shared a relationship that began in 1936 when they became acquainted while von Kármán was a research scientist at the California Institute of Technology (CIT) and Arnold was the commander of March Field in San Bernardino. In the time since, organizing an airborne combat arm to help prosecute a world war had solidified one of Arnold's long-standing beliefs: the civilian minds harbored within America's universities and research labs were a vital resource for insuring the military's future effectiveness. Arnold was acting on that belief in September 1944 when he discreetly summoned von Kármán to meet with him in New York. The civilian scientist recounts their conversation in his autobiography, *The Wind and Beyond:*

> General Arnold wasted no time in coming to the point: "We have won this war, and I am no longer interested in it. I do not think we should spend time debating whether we obtained the victory by sheer power or by some qualitative superiority. Only one thing should concern us. What is the future of air power and aerial warfare? What is the bearing of the new inventions, such as jet propulsion, rockets, radar, and other electronic devices?... I want you to come to the Pentagon and gather a group of scientists who will work out the blueprint for air research for the next twenty, thirty, perhaps, fifty years."[2]

It is clear that the Air Force's leading general was casting his and the Air Force's sights well beyond the war. Not so apparent perhaps is that he was casting them well above it too. Dr. von Kármán's functional area of expertise was rocketry.

Written documentation of the aerospace concept's beginning appears two months later. A memorandum from Arnold dated 7 November 1944 makes official his offer to von Kármán. "I believe the security of the United States of America," it opens, "will continue to rest in part in developments instituted by our educational and professional scientists." The Commander of the AAF goes on to ask the rocket scientist from Cal Tech to assemble a board of scientists and thinkers to examine and report on long-range strategic planning issues that will place the Air Force's "postwar and next-war research and development programs" on a "sound and continuing basis." Arnold was seeking a framework of programs to guarantee…

> …the security of our nation and serve as a guide for the next 10-20 year period.
>
> I presume methods of stopping aircraft power plants may soon be available to our enemies. Is it not now possible to determine if another totally different weapon will replace the airplane? Are manless remote-controlled radar or television assisted precision military rockets or multiple purpose seekers a possibility? Is atomic propulsion a thought for consideration in future warfare?... I am asking you and your associates to divorce yourselves from the present war in order to investigate all the

[2] Theodore von Kármán, with Lee Edson, *The Wind and Beyond: Theodore von Kármán Pioneer in Aviation and Pathfinder in Space* (Boston: Little, Brown and Company, 1967), 267-268.

possibilities and desirabilities for postwar and future war's development as respects the AAF.[3]

Biddings such as these from persons of General Arnold's stature—particularly during war—are less requests than tacit commands. Arnold's memo brought Dr. Theodore von Kármán to the Air Force as its first scientific advisor and chair of its inaugural Scientific Advisory Group (SAG). More importantly, the memo shows the Air Force's senior leader beginning to think and act with an implicit assumption that the airman's domain did not end where the atmosphere did. To support this statement further, consider General Arnold's perspective in the fall of 1944.

First, and most importantly, Arnold was air power theory's most powerful and influential disciple. The intellectual justification for the development of America's air arm had approached World War II as a body of ideas cobbled together primarily from the thoughts of Guilio Douhet, Billy Mitchell, and the Air Corps Tactical School. *In theory,* "strategic attack," enabled by the employment of airplanes, would be generally indefensible. "The bomber would always get through." *In theory,* air power would thus be decisive in combat. Focusing aerial bombardment on an enemy's war-making capability deep within its interior—and well beyond the traditional fields of combat—would bring a nation to its knees. *In theory,* air power would change the very nature of warfare. And upon this intellectual foundation, Arnold had sat since 1938 orchestrating the development and evolution of America's Air Force.[4]

On the day that the nation's leading air power advocate sat with von Kármán at La Guardia, Eisenhower's soldiers were moving onto German soil, and MacArthur's were

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[3] Cited from a memo dated 7 November 1944 from Gen Arnold to Dr. von Kármán, in Theodore von Kármán, *Toward New Horizons*, Vol. 1, "Science, the Key to Air Supremacy," a report to the General of the Army H. H. Arnold by the Army Air Force Scientific Advisory Group, 15 December 1945, iii-v.

preparing for the same in the Philippines. And Arnold could reflect with perspective upon air power's contribution to bringing these events about. Although experience by this point had found the airmen's theory in need of refinement, air power's crucial role in the war's outcome could not be denied. From this perspective, even in September 1944, Arnold could begin to see the future role for air power in America's post-war defense establishment. Helping to clarify this vision further still was his knowledge of two technologies beginning to appear on the horizon.

The first was the atomic bomb. By the fall of 1944, Arnold had been privy to the Manhattan Project for some time. Six months earlier, he had met with Major General Leslie Groves, the project's lead military officer, to clarify the Air Force's role in the program. In the time since, Arnold had created the 509th Composite Group, had handpicked Colonel Paul W. Tibbits as its commander, and had approved the necessary modifications for the program's chosen delivery platform, the B-29s. Test flights would begin in October. Groves recalled later Arnold's unwavering and unquestioning commitment throughout the atomic bomb's development, fully cognizant of its importance to the war and the future of air power.[5] Indeed, as Arnold sat with von Kármán in New York on 12 September, the general was en route to the second Quebec Conference, in part to support the president's discussions with Churchill concerning the weapon's status and future use.[6]

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[4] General Arnold was appointed Chief of the Army Air Corps on 29 September 1938.

[5] Leslie R. Groves, *Now it Can Be Told: The Story of the Manhattan Project* (New York: Harper & Row, Publishers, 1962), 253-60.

[6] Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven: Yale University Press, 1987), 168.

Rocketry was the second technology clearly within General Arnold's sights in September 1944. Already, the war had beckoned to the realm of possibility the Buck Rogers and Flash Gordon space serials gracing America's airwaves and movie screens since the early 1930s. Hitler's effort to marry long-range rockets with explosives was a development the General was no doubt following closely. American bombers had attacked Germany's secret V-2 test facilities at Peenemünde on three different occasions during the summer and by the time Arnold met with von Kármán, the General had certainly heard that despite these summer raids, London, only five days earlier, had suffered the opening salvo of Germany's V-2 attacks.[7] Moreover, he was aware of his own Army's ongoing research in the field as well—the scientist about to join his staff was the man largely responsible for these developments.

In the fall of 1944 the U.S. Army's research program for rocket development was called "ORDCIT." The name was an acronym that captured the relationship of the program's participants: Army Ordnance and Theodore von Kármán's team of scientists and engineers from CIT. Von Kármán and his colleagues had been experimenting independently with rockets since the late 1930s. In November 1943, the Cal Tech scientists concluded in a report forwarded to the War Department that with state of the art technology, a 10,000-lb. rocket could reach an altitude of 75 miles.[8] Within two months, Army Ordnance had von Kármán's team under contract and their labs moving to White Sands, New Mexico. In December 1944, the ORDCIT program would fire an eight-foot,

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[7] Michael J. Neufeld, *The Rocket and the Reich: Peenemünde and the Coming of the Ballistic Missile Era* (Cambridge: Harvard University Press, 1995), 245, 247; also cited in Robert L. Perry, *Origins of the USAF Space Program, 1945-1956,* V, History of DCAS 1961. Air Force Systems Command (AFSC) Historical Publications Series 62-24-10 (Los Angeles: AFSC, Space Systems Division, 1961), 4.

[8] Von Kármán, *The Wind and Beyond,* 264-265. In his memoir, von Kármán suggests that this document was the first official document of the U.S. Missile Program.

500-lb. missile 11 miles down range and begin to explore the worth of attaching lifting devices to improve their rockets' range and guidance characteristics.[9] By themselves, such results were hardly a threat to Arnold's organization. However, when coupled with the atom bomb's potential and Germany's V-2 achievements, they gave America's leading airman sufficient cause for concern.

Until this point, missile development in the Army had proceeded along two separate but comfortable paths. Early air-breathing cruise missile programs—converted airplanes stripped of pilots and enhanced with explosives—landed naturally within the realm of the Army Air Corps' responsibility. Rockets, on the other hand, long applied to enhance artillery capability, fell comfortably within the jurisdiction of Army Ordnance. By mid-1944, however, rocket technology had improved to a point where its potential in operational applications began to encroach upon the Air Force's domain of strategic attack.

As rocketry showed the capacity to propel battlefield artillery well beyond the battlefield, its operational overlap with the Air Force's cruise missile—let alone with the service's *raison d'être*—had not gone unnoticed. Debate among the Army's three forces—air, ground, and service—over who ultimately should control missile development arose, and by early September 1944, had reached the highest levels of Army command. Only the week prior to Arnold's La Guardia meeting with von Kármán, a memo circulated throughout the Air Staff outlining its position in the growing debate. Anything launched or controlled by aircraft, directed against aircraft, or serving as an

[9] Michael H. Gorn, *Harnessing the Genie: Science and Technology Forecasting for the Air Force 1944-1986* (Washington D.C.: Office of Air Force History, United States Air Force, 1988), 16; von Kármán, *The Wind,* 265; and Maj Gen John B. Medaris, U.S. Army, Ret., with Arthur Gordon, *Countdown for Decision* (New York: G.P. Putnam's Sons, 1960), 52-53.

alternative to bombers or fighters should be the sole purview of the AAF.[10] The Army's ground and service forces of course saw it differently.

On 14 September, the War Department's General Staff met with representatives from all sides to resolve the issue. The meeting's results came in a policy memo from the office of Lt. General Joseph T. McNarney, Deputy Chief of Staff of the Army, dated 2 October 1944. The McNarney memo declared:

> a. That the Commanding General, *Army Air Forces*, have research and development responsibility, including designation of military characteristics, for all guided or homing missiles dropped or launched from aircraft.
>
> b. That the Commanding General, *Army Air Forces*, have research and development responsibility for all guided or homing missiles launched from the ground which depend for sustenance primarily on the lift of aerodynamic forces.
>
> c. That the Commanding General, *Army Service Forces*, have research and development responsibility for guided or homing missiles launched from the ground which depend for sustenance primarily on momentum of the missile.[11]

Unfortunately, this was a policy based on the current nature of these technologies rather than the future potential of their operational effects. "Winged" cruise missiles looked and performed like aircraft and therefore their development remained an Air Forces responsibility. Alternatively, wingless ballistic missiles were recognized as an artillery variant and thus, remained a Service Forces purview.[12] As a result, although the McNarney memo dampened somewhat the organizational turbulence over control of

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[10] Kenneth P. Werrel, *The Evolution of the Cruise Missile* (Maxwell AFB, AL: Air University Press, September 1985), 79.

[11] Joseph T. McNarney, Deputy Chief of Staff, Memo to the Commanding General, Army Air Forces, October 2, 1944, as cited in Edmond Beard, *Developing the ICBM* (New York: Columbia University Press, 1976), 22. Emphasis mine.

[12] Werrell, 80; and Walter A. McDougall, *…the Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985; Baltimore: The Johns Hopkins University Press, 1997), 87. The Service Forces were responsible research and development of Ground Forces equipment.

missile development in the mid-1940s, it did little to quell the strategic attack turf battles that would rattle the Defense Department during the coming decade.

General Hap Arnold would retire well ahead of this coming strife, but his perspective in the fall of 1944 was at least this: World War II had culminated and legitimized a new form of warfare, two technologies were emerging that had dramatic potential for the future of air power, and the organizational stakes for who would control them were already being driven. Also clear at this point was that an Air Force general was on the verge of poaching the Army's leading rocket scientist. Thus, with the benefit of hindsight, one can conclude with reasonable confidence that in the fall of 1944, Arnold had begun to consider that the farthest reaches of the atmosphere in no way marked the outer edge of the Air Force's domain.

GESTATION

The final phases of World War II commanded Arnold's attention throughout the first half of 1945, but at the war's conclusion, with his retirement nearing, Arnold returned to shaping the Air Force's future and by extension completing the gestation of the aerospace concept. While the SAG was preparing its study under Dr. von Kármán's direction, Arnold took four steps that would profoundly influence the Air Force's future in space.

The first occurred in September 1945. Douglas Aircraft Corporation approached the general with a proposal to organize a research project to support the Air Force's long-range strategic planning efforts. A group of civilian scientists and engineers would form a think tank dedicated specifically to the Air Force, whose role would be to explore the relevance of general scientific and technological advancements as applied to the service's mission. This was a proposal hand tailored to Arnold's vision, which the Air Force chief endorsed by earmarking $10 million to fund it during the upcoming year. From this arrangement, Project RAND would be born.[13]

General Arnold's second step was to establish a new division in his headquarters to oversee research and development (R&D) planning within the Air Force. The new structural arrangement pulled this critical staff function out from under the tight auspices of Air Materiel Command's (AMC) procurement process where it competed directly with the Air Force's short-term resource requirements. The new division facilitated greater cross-pollination between the Air Force and the civilian perspectives Arnold was so carefully folding into his Air Staff. Its effectiveness would eventually support a much broader R&D structural realignment four years hence. To head this new division, Arnold selected Major General Curtis E. LeMay.[14]

With his third step, Arnold staked for the Air Force the military's first organizational claim on space. On 12 November 1945, he officially submitted his "Third Report to the Secretary of War," the Honorable Robert Patterson. In it, Arnold set down air power theory's argument, projected its future, and forecasted a long-range vision for the Air Force that was clearly imbued with an aerospace perspective. Hindsight illuminates even more how remarkable this document was. Arnold wrote:

> The Strategic Theory, as applied to the United States air warfare concept, postulates that air attack on internal enemy vitals can so deplete specific industrial and economic resources, and on occasion the will to resist, as to make continued resistance by the enemy impossible.…
>
> The following principles should guide those who are responsible for planning and conducting strategic air warfare:

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[13] David N. Spires, *Beyond Horizons: A Half Century of Air Force Space Leadership* (Peterson AFB, CO: Air Force Space Command, Spring 1995), 8-9.

[14] Spires, 9.

a. Through a world-wide intelligence system, maintain constantly up-to-date information regarding all phases of the national life, economy, and philosophy of potential enemy states.

b. Maintain an analysis, continuously being revised to meet new conditions, to show the importance of all industries and other potential enemies and to evaluate the relative importance of each of the units in each activity.

c. To meet any emergency with the rapidity which survival in future wars will necessitate, prepare and maintain plans, in consonance with the latest information to provide for destruction of the decisive units of the key industries and other activities of each potential enemy nation….

Strategic air warfare can be neither soundly planned nor efficiently executed without a continuous flow of detailed information of this kind….

Today, our Army Air Forces are the recognized masters of strategic bombing….

When improved anti-aircraft defenses make this impracticable, we should be ready with a weapon of the general type of the German V-2 rocket, having greatly improved range and precision, and launched from great distances. V-2 is ideally suited to deliver atomic explosives, because effective defense against it would prove extremely difficult.

If defenses which can cope even with such a 3,000-mile-per-hour projectile are developed, we must be ready to launch such projectiles nearer the target, to give them a shorter time of flight and make them harder to detect and destroy. We must be ready to launch them from unexpected directions. *This can be done from true space ships, capable of operating outside the earth's atmosphere. The design of such a ship is all but practicable today; research will unquestionably bring it into being within the foreseeable future. …*

(T)his country…must recognize that real security against atomic weapons in the visible future will rest on our ability to take immediate offensive action with overwhelming force. It must be apparent to a potential aggressor that an attack on the United States would be immediately followed by an immensely devastating air-atomic attack on him.[15]

[15] Gen Henry H. Arnold, "Air Power and the Future: Third Report to the Secretary of the War by the Commanding General of the Army Air Forces," 12 November 1945. In Eugene M. Emme, *The Impact of Air Power: National Security and World Politics* (Princeton: D. Van Norstrand Company, Inc., 1959), 306, 307, 309, 310, 311. Emphasis mine.

Given the nascent state of rocket technology at the time, Arnold's report shows remarkable foresight. With World War II hardly over, he saw missiles and satellites as the means for securing America's defense. Although convinced of the value of manned aircraft, he saw a pilot-less force in the future and placed his support behind developing intercontinental ballistic missiles (ICBMs).[16] Furthermore, Arnold recognized the need for sound and constantly updated intelligence to support the application of force from the "air." Interestingly, President Truman's scientific advisor, Vannevar Bush, promptly ridiculed Arnold's report as "more or less fantastic" and something that "…is impossible today and will be impossible for many years."[17] And yet, in retrospect, Arnold had sketched the essence of America's Cold War defense posture over the next two decades at least, all founded upon and consistent with air power theory. There is little doubt that at the end of 1945, in Arnold's mind, the vertical domain had no boundary. His remaining task was to plant this perspective into the Air Force's next generation of leaders. But hardly before the ink had dried on his visionary report to the War Secretary, a different report emerged from his newly-formed SAG that threatened to temper the general's far-reaching vision.

Toward New Horizons, the SAG's long-range strategy report that Arnold had commissioned the year prior, appeared on 15 December 1945. Ironically, it offered only lukewarm support to General Arnold's predictions of ICBMs and satellites—each received mention only in passing. Instead, von Kármán and his colleagues saw the technological barriers facing these systems as insurmountable for at least a decade.[18]

[16] Spires, 9, 10.

[17] Perry, 9, as quoted in the footnote.

[18] Perry, 11.

Consequently, their vision focused less on space and more instead on the future of jet propulsion systems.

> The next ten years should be a period of systematic, vigorous development, devoted to the realization of the potentialities of scientific progress, with the following goals: supersonic flight, pilot-less aircraft, all-weather flying, perfected navigation and communication, remote-controlled and automatic fighter and bomber forces, and aerial transportation of entire armies.[19]

Its main conclusions argued for the necessity of a powerful air force capable of "reaching remote targets swiftly and hitting them with great destructive power, securing air superiority over any region of the globe, landing, in a short time, powerful forces, men and firepower, at any point on the globe, and defending our own territory and bases in the most efficient way."[20]

Compared to Arnold's vision, *Toward New Horizons* was decidedly air-centric. It too was a landmark document in establishing the critical relationship between technology and the Air Force's long-range planning efforts, a relationship that would invariably prove significant in the coming decade. While also fully consistent with air power theory, it was, however, a subset within Arnold's broader scheme. Von Kármán's primary focus was on air-breathing jet propulsion systems, a position that would inevitably affect a delay in ballistic missile development within the service, which by extension, would slow the Air Force's move into space.[21] Thus, at a conceptual level, *Toward New Horizons* marks the beginnings of a subtle tension that would emerge within the Air Force in the coming years between Arnold's broader vision, which fully included space, and von Kármán's more conservative atmospheric-bound projections.

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[19] von Kármán, *Toward New Horizons*, ix.

[20] von Kármán, *Toward New Horizons*, 4.

Despite von Kármán's tempered report and the more severe chiding Arnold heard from scientific circles outside of the Air Force, in a final act before his official retirement, the nation's only General of the Air Force took great pains to see his aerospace vision passed on to the air arm's succeeding generation. Early in February 1946, he gathered some 250 of his key personnel in the Pentagon auditorium and spoke to them of the future they might expect. One attendee noted later Arnold "was pretty well convinced that an airplane was not a good device to wage war in. He said if (airmen) didn't quit operating and get to thinking, they would find themselves in the Service Forces where they belonged."[22] The retiring general urged his people to employ as many scientific brains as they could find. Another at the meeting recalled how Arnold had "talked about supersonic aircraft, rockets, and the exploration of space. … He warned them… to be willing to discard the obsolete, however sentimentally attached to it they might be, and to examine new ideas, however outlandish they might appear at first glance." At the end of his speech, Arnold is said to have looked down and said to those gathered before him: "I know you people think the old man has lost his marbles and ought to retire. But I hope you'll all remember what I said here today."[23]

General Hap Arnold innovated the aerospace concept. He envisioned, articulated, and justified, within the intellectual framework around which the Air Force was established, an Air Force future that extended naturally beyond the atmosphere. Moreover, he established an environment within which his vision could take root. He hoisted the R&D sail further up the organizational mast and lashed to it a community of

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[21] Spires, 11.

[22] Perry, 11, in footnote.

civilian scientists who could help navigate through the technological winds that were blowing. Then, stepping into retirement, he bade his vessel of forty-one years farewell.

The aged air warrior's parting words would in two months time give impetus to a series of profound aerospace-embedding actions within the Air Force. Because these actions would constitute the first initiated by others in the organization besides Arnold, they mark what this study considers the beginning of the aerospace concept's institutionalization. Before considering them, however, discussion returns momentarily to the rocketry pursuits of the Air Force's service competitors, which also would influence the aerospace concept's early stages of institutionalization. If it is somewhat ironic that Arnold's association with a rocket scientist would prove to temper the Air Force's internal perspective on the pursuit of space, the irony is dramatic when one considers the influence of the rocket scientist, a "von" as well, who filled von Kármán's seat at ORDCIT.

EARLY INTERSERVICE CHALLENGES

When the spoils of victory brought Werner von Braun to America in September 1945, the Air Force was the only service thinking at the senior leadership level about space. Army Ordnance, meanwhile, had been building and launching larger and larger rockets in the deserts of New Mexico. Soon, because of this German's influence, both the Army and the Navy would be seriously eyeing space as well.

Von Braun played a leading role in Germany's rocket program, and the extent to which the Germans had developed rocket technology made him a prize catch in World War II's aftermath. Husbanded out of Germany in a secret intelligence operation known

[23] Thomas M. Coffey, *HAP: The Story of the U.S. Air Force and the Man Who Built it, General*

as "Paperclip," von Braun, 120 of his colleagues, and 300 boxcar loads of V-2 components arrived at Fort Bliss, Texas in September 1945. They were just in time to witness a test-launch of ORDCIT's most ambitious missile test thus far. On 26 September, the Army's *WAC Corporal* reached an altitude of 42 miles.[24]

In von Braun, with his accompanying complement of scientists, engineers, plans, and parts, the Army now had the world's most advanced rocketry research team. The Germans meshed perfectly with the Army's ambition to develop a long-range strategic "artillery" capability. But von Braun also brought with him a long harbored interest in space that the Nazi regime had squelched in its more pressing need to develop the "vengeance weapon." Thus, in the Army, von Braun had found refuge where he could refocus on his life-long dream, which, perhaps more than his rocketry genius alone, would have the most influence on the Army's budding missile program.

By April of 1946, ORDCIT, now re-designated "Project Hermes," had reconstructed and successfully launched its first V-2 from the parts recovered in "Operation Paperclip." The event made the headlines of the *New York Times*—a public relations coup for the Army that did not go unnoticed by those in the Air Force. Both sides recognized the importance of public support in the emerging debate over unification of the armed services.[25] Airmen were staking their independence on the strategic attack mission. The Army's ballistic missiles were beginning to challenge that mission. Holding "what was essentially the single-minded belief that guided missiles, no matter what their range, were

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Henry "Hap" Arnold (New York: The Viking Press, 1982), 377-8.

[24] Medaris, 53.

[25] Beard, 34-36; and Roger D. Luanius, "Prelude to the Space Age," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program,* vol. I, *Organizing for Exploration,* ed. John M. Logsdon (Washington, D.C.: NASA History Office, 1995), 14.

really long-range artillery... [and] therefore an obvious Army weapon," however, they were beginning to challenge the mariner's mission as well.[26]

The Navy's role was to control the high seas. Naval leadership, attuned to the emerging possibilities of rocketry to extend the reach of their fleets, as well as the Army's organizational maneuvering with the Germans and Project Hermes, decided to enter the missile debate. The chief of naval operations established a Guided Missile Section within the Navy Department with a straightforward mandate: "To develop guided missiles for use in war."[27] Despite this mandate, the early beginnings of naval rocketry were focused purely on research and, with the war's end, their missile program took on a decidedly civilian character.

Naval guided missile development had fallen to the Naval Research Laboratory (NRL). But as the war drew to a close, NRL's work force, largely a collection of civilian scientists and physicists, welcomed the opportunity to focus again on basic research. One among them was Dr. Milton W. Rosen, who had reviewed the classified debriefing papers on the German V-2 program.

In the fall of 1945, Rosen approached his section chief with a proposal to use rockets to study the properties of the upper atmosphere. Rosen sold the idea to his research team and in December 1945, NRL established the Rocket Sonde Research Branch for the clearly stated purpose of doing exactly that.[28] The following month, responding to an Army invitation for government agencies and universities to participate in high-altitude

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[26] William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998), 125.

[27] Burrows, 124.

[28] Milton W. Rosen, *The Viking Rocket Story* (New York: Harper & Brothers, Publishers, 1955), 20.

experiments with their program at White Sands, NRL's rocket team relocated to New Mexico and established the beginnings of what would in short time evolve into the Viking missile program.[29] The program's "civilian" character also would be important in the years to come. But by mid-1945, von Braun's influence was taking the Navy beyond mere missilery.

Commander Harvey Hall, of the Navy's Bureau of Aeronautics Electronics Division, also found himself captivated by the German's work. Inspired by a provocative space study written by von Braun during his debriefing period in May 1945, Hall assembled a team to examine the feasibility of von Braun's concept of an artificial satellite.[30] By late 1945, the Committee for Evaluating the Possibility of Space Rocketry produced a report concluding that an orbiting satellite was technologically feasible. Such a system had the obvious potential to bring far-reaching communications and reconnaissance capability to naval ships operating on the high seas. Estimating, however, that the satellite design work alone would cost between $5 million and $8 million, Hall's team was unable to garner full funding support from within the Navy for the project.[31] By January 1946, Hall was turning to the other services for support. He would propose the plan as an interservice venture at the War Department's Aeronautical Board meeting in March, which met every two months to coordinate aeronautical pursuits between the services.

Thus, as 1945 came to a close, and with World War II not even five months over, already all three services had elements within them that were eyeing the heavens, if for

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[29] Rosen, 22.

[30] Burrows, 118.

[31] R. Carghill Hall, "Earth Satellites, A First Look by the United States Navy," in *Essays on the History of Rocketry and Astronautics: Proceedings of the Third Through the Sixth History Symposia of the International Academy of Astronautics*, vol. II, ed. R. Cargill Hall (Washington, D.C.: NASA Scientific and Technical Information Office, 1977), 258.

different reasons. The Army, as an organization, was still focused on rocketry for artillery purposes, but von Braun was in place and would exert a strong bent towards space in the future. R&D elements within the Navy saw potential in space to support its mission of sea control but the service as a whole had not yet come to embrace the idea. The Air Force at this point was only involved in aerodynamic cruise missiles, but organizationally, it was looking more ambitiously into space than the other two services. Arnold had indeed made a lasting imprint. The year that followed his retirement would make this clear.

BIRTH

1946 would witness the heralding of the Air Force's aerospace concept that had first emerged from the vision of General Arnold over the fifteen months that preceded it. During this year, an organizational "strategy" to secure the Air Force's role in space developed, but largely to stem the Army's ballistic missile challenge as well as the Navy's satellite plans.

On the second day of the year, a revealing memo appears from Colonel T. A. Sims of the newly formed Research and Development Division (of which Arnold placed LeMay in charge). It was addressed to General Ira Eaker, the Air Force's Deputy Commander. The memo questioned the ambiguity of the McNarney policy from October 1944 (see p. 54) and recommended that the guided missile question be addressed at the next Air Staff meeting. As Colonel Sims reasoned to the second highest-ranking officer in the Air Force:

> There is no one agency within the War Department that has been assigned the responsibility for the development of guided missiles. ...Many Ordnance developments encroach on the AAF field, for if controlled fins

> are placed on a [ballistic] missile to guide its path, it then becomes an aerodynamic problem. ...
>
> The [issue] is whether we should continue as is for the time being, ...or whether we should attempt to energize our guided missiles program and take over some of the projects started by Ordnance...
>
> ...would it not be wise at this time to include as part of our 70-group Peace time Air Force and also in our mobilized Air Force a certain number of strategic missile groups? Admittedly, we do not know the composition of a guided missile launching force, however, we could show these without a troop basis at this time, just to indicate progressive thinking and the AAF interest in taking a major part in the lightning warfare of the future. If we do not do this the Artillery may beat us to the punch.[32]

In January 1946, the Air Force was developing *cruise* missiles but had nothing remotely resembling a strategic *ballistic* missile program, let alone plans for building an operational force with them.

Meanwhile, Cmdr. Hall was successful in getting the Navy's interservice satellite proposal into the War Department's 7 March Aeronautical Board agenda. Amidst noticeable interest, the board agreed to discuss the idea further when it reconvened on 14 May.[33] The Navy's proposal, and the two-month intermission that followed, had a profound effect within the Air Force.

The Aeronautical Board's Air Force members returned with the proposal and presented it to their boss, Major General LeMay. The Deputy Chief of Staff for Research and Development in turn went directly to General Carl A. Spaatz, who had replaced Arnold as the AAF Commanding General on 1 March. Significantly, LeMay also brought a piece of relevant personal experience to this meeting. In August 1937, LeMay had participated in an Air Corps sea search mission whereby B-17s located,

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[32] Col T. A. Sims, U. S. Air Force to General Eaker, 2 January 1946, Memorandum, "Guided Missiles," 145.86-19, IRIS 118194 in USAF Collection, Air Force Historical Research Agency, Maxwell AFB, Alabama (hereafter USAF AFHRA). Memo is also cited in Beard, 33.

photographed, and "bombed" the battleship *Utah* to "prove" that the Air Corps, not the Navy, could better provide for long-range sea reconnaissance.[34] Now, nine years later, and for the first time, AAF leaders fashioned their rationale for an Air Force space mission: "military satellites represented an extension of strategic air power" and, therefore, the Air Force should have primary responsibility for any military satellite vehicle. William Burrows, in *This New Ocean,* points out that "this was most likely the first time that [the Air Force confronted the other services and] claimed space as a continuation of their traditional operational environment."[35] Lacking any detailed satellite feasibility studies to set against the Navy's, however, LeMay tapped into the funds Arnold had set aside for just such a project and charged RAND with opening its operations.[36]

Pulling together 50 of Douglas' best scientists and engineers, the newly formed think-tank took just three weeks to produce a groundbreaking 321-page report.[37] RAND's *Preliminary Design of an Experimental World-Circling Spaceship* offered the first comprehensive analysis of the potential military uses of satellites. As opposed to von Kármán's assessment delivered to Arnold just five months prior, which put the development of a satellite farther than ten years away, RAND's report predicted that, at a cost of $150 million, the U.S. could launch a 500-pound payload into a 300-mile high orbit *within five years*. It supported this claim with detailed technical feasibility studies backed by even their most conservative engineers. The study also detailed a number of

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[33] Burrows, 124-125; and Spires, 14.

[34] Burrows, 125.

[35] Burrows, 127.

[36] Spires, 14.

[37] Perry, 12.

potential uses that included communications, observation, weather, and weapon impact spotting, but ruled out its early use as an atomic weapon due to the weight of atomic warheads at the time. [38] However, its most oft quoted passage carried the satellite's potential still further.

> In making the decision as to whether or not to undertake construction of such a craft now, it is not inappropriate to view our present situation as similar to that in airplanes prior to the flight of the Wright brothers. We can see no more clearly all the utility and implications of spaceships than the Wright brothers could see fleets of B-29s bombing Japan and air transports circling the globe.[39]

The analogy here was clear. While early on, the satellite might only be capable of passing radio communications or taking pictures, future technological advances no doubt held great promise for its use as a weapon system.

At the next War Department Aeronautical Board meeting on 14 May 1946, armed now with RAND's epic report and standing firm on the notion that satellites represented an extension of strategic air power, LeMay formally rejected the Navy's proposal for an interservice space program. The move to claim Air Force responsibility for military satellites reaffirmed Arnold’s earlier claim on space operations in general.[40]

During the month that RAND put together its report, the Air Force also made its first concrete move into the rocket propelled missile business. In April, the Air Force awarded a contract to Consolidated Vultee (soon to become Convair and later General

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[38] The RAND report summary's major points were drawn largely from Spires' discussion in *Beyond Horizons*, 15-16.

[39] *Preliminary Design of an Experimental World-Circling Spaceship* (Douglas Aircraft Company, Inc., Santa Monica Plant Engineering Division, Report Number SM-11827, 2 May 1946), 146.01-154, IRIS No. 1006961, in USAF AFHRA, 1.

[40] Spires, 14, 16.

Dynamics) to study the development of a long-range ballistic missile. From this study the Atlas program would later emerge.[41]

By early fall of 1946, Air Force thinking on the missile control question was clearing even more. The following memo from Maj. General LeMay to General Spaatz appeared on 20 September and showed the Air Force's developing position on strategic missiles:

> At the outset it was recognized that Ordnance was entering the field early and aggressively to antedate AAF competition, so that the 2 October 1944 [McNarney] directive was proposed and written by the AAF with intent to eliminate destructive competition, and to limit the Ordnance Department to non-aerodynamic missiles. ...
>
> One very serious reason for not giving ground is the stated opinion of Army Ground Forces that AGF should operate its own guided missiles, close support aircraft, and strategic bombardment aircraft, classing all these as extensions of artillery. It is fairly certain that if development of missiles is turned over to Ordnance, operation will be done by Army Ground Forces, and it will be only a short and logical step from this to operation of support and strategic aircraft by AGF. ...
>
> Our best course seems to be to ... [request] for assignment of all guided missiles, driving at economy and clear, workable directives, making it plain that our ultimate aim is to better prepare the U.S. for the war which is sure to come. ...
>
> The long-range future of the AAF lies in the field of guided missiles. Atomic propulsion may not be usable in manned aircraft in the near future, nor can accurate placement of atomic warheads be done without sacrifice of the crews. In acceleration, temperature, endurance, multiplicity of functions, courage, and many other pilot requirements, we are reaching human limits. Machines have greater endurance, will stand more severe ambient conditions, will perform more functions accurately, will dive into targets without hesitation. The AAF *must* go to guided missiles for the initial heavy casualty phases of future wars.[42]

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[41] Roger D. Launius, "Titan: Some Heavy Lifting Required," in *To Reach the High Frontier*, ed. Roger D. Launius and Dennis R. Jenkins (Lexington, KY: University Press of Kentucky, 2002), 149.

[42] Memo from Gen LeMay, DCAS, R&D, to Gen Spaatz, dated 20 September 1946. File "AAF, GM Policy, 1946." Box "A-7 Catapults." HQ USAF, DCS/D, GM Branch, National Archives, as cited in Beard, 37-39. Emphasis in original. Also discussed in McDougall, 90; and Spires, 18-19.

LeMay's 1946 position on ballistic missiles would remain relatively unchanged in his role, throughout the coming decade, as the primary architect and leader of Strategic Air Command (SAC).

Of the aerospace "events" that occurred within the Air Force in 1946, the diamond in the rough was RAND's groundbreaking report. However, it was not for its obvious long-term visionary value, but rather because the report explicitly recognized that missile and satellite development intimately complement one another. "There is little difference in design and performance between an intercontinental rocket missile and a satellite. ...Consequently, the development of a satellite will be directly applicable to the development of an intercontinental missile."[43] Unfortunately, it would take the Air Force another *nine years* to recognize this relationship. In the interim, missile advocates within the Air Force would tend to see the satellite as a resource competitor.

By mid-1947, there is clear evidence that General Arnold's vision was beginning to take hold within the organization. Thus, the institutionalization of the aerospace concept had begun. Those airmen involved with the events discussed thus far drew little notice that space was a realm different or distinct from the atmosphere. It is important to keep in mind, however, that these activities had been limited to a tiny, albeit influential, portion of the Air Force. Thus, from the perspective of the entire organization, the institutionalization process was only in the early beginnings of habitualization. Top-level policy makers had adopted Arnold's perspective and had begun to generate and formalize structural arrangements within the organization through which to implement it. The aerospace concept, though nascent at this point, had begun to embed—even before the

[43] *Preliminary Design of an Experimental World-Circling Spaceship*, 10.

Air Force had become an independent service. But environmental factors had just as much to do with these developments as did factors internal to the Air Force. The challenge from other services encroaching upon what the Air Force saw as its "turf" provided significant motivation for these early aerospace encouraging activities. In sum, the aerospace concept first emerged in the form of General "Hap" Arnold's far-reaching vision and was able to develop from the fall of 1944 through 1946 because the contextual environment, emerging technologies, and the concept's intellectual foundation all supported it. Inter-service challenges from the Army and the Navy only encouraged its growth.

Such was the state of development of the airman's view of the vertical as the Air Force approached its independence. But if, in 1946, the aerospace concept appeared to be on the verge of coming in like a lion, during the remaining years of the Truman presidency, one would be hard pressed to argue that it might not go out like a lamb. Fiscal realities, the perceived immediacy of the growing Soviet threat and the organizational challenge of constructing an independent service while fulfilling the needs of the nation's defense would pull the Air Force's focus inward toward more immediate issues and send the burgeoning concept into all but hibernation.

AEROSPACE STRUGGLES TO STAND (1947-52)

Beginning roughly in July 1947, the aerospace concept fell upon "hard times," stagnating, and even receding, for the better part of the next six years. Environmental factors—those external to the Air Force and beyond its control—contributed in part to its lack of development. The nation's chosen security strategy against the emerging Soviet threat, a waning domestic economy, and an interservice battle over roles and missions—all played a part in hindering the concept's ability to embed within the organization. Interestingly, however, issues internal to the Air Force contributed as much to the concept's stall as environmental influences. For the first three years of Air Force independence, leadership focus and resource allocation fell to near-term problems as the Air Force struggled to build its strategic "force in being." As a result, organizational interest in space waned and the momentum the aerospace concept carried into this period, by 1950 had all but disappeared. Thereafter, however, signs emerged of a gradual upswing, as funding was released to shore up defense. Finally, toward the end of the Truman presidency, thermonuclear testing successes provided a needed boost to the concept as a new administration was about to take shape.

THE COLD WAR AND ECONOMIC REALITY

The "emergence of the Cold War" generally characterized the geopolitical context from mid-1947 through 1952. In June 1947, Congress enacted the Marshall Plan. Three months later, the Soviets established their own economic bloc in the east. The move foreshadowed the evolving nature of this ideological conflict as an economic divide fell across the middle of Europe. The following summer, Russia blockaded Berlin and for a year, put to test the West's resolve. In Berlin's aftermath, democratic Europe's collective efforts moved beyond economics and into defense, taking shape with the formation of NATO. No longer could anyone deny Churchill's prescient observation from two years earlier—an iron curtain had descended across the continent.

In 1947 and 1948, the Cold War concentrated in Europe. Thereafter, it went global. 1949 saw Mao's communists triumph in China and Stalin's scientists successfully detonate an atomic device. Then, in June 1950, from a horizon upon which the potential of nuclear parity among the superpowers now loomed, North Koreans marched southward to attempt to reunite a politically divided peninsula.

Within this evolving geopolitical context, a national security debate emerged that established the intellectual foundation for America's Cold War strategy. Because the outcome of this debate would drive the character and make-up of America's post-war military, and by extension, the aerospace concept's development, it is worth examining its nature.

Walter McDougall, in *...the Heavens and the Earth*, described the dispute as one that sought to understand "the nature of the (Soviet) beast" as framed by the ideas of George Kennan and Paul Nitze.[44] Kennan argued in July 1947 that "the main element of any United States policy toward the Soviet Union must be that of a long-term, patient but firm and vigilant *containment* of Russian expansive tendencies."[45] Noticeably ambiguous in Kennan's position, however, was the undefined meaning of "long-term." Consequently, America's "hawks" were unconvinced.

Nitze held to a tougher line that he eventually submitted in a March 1950 report to the Secretary of State. Nitze's report "recommended a 'rapid and sustained build-up of the political, economic, and military strength of the free world....' Only the United States had the wherewithal to balance the power of an adversary that, unlike previous

[44] McDougall, 103.

[45] X, [George F. Kennan], "The Sources of Soviet Conduct," *Foreign Affairs* (July 1947): 572-574, 576-580, 575. Emphasis mine. Actually, Kennan's argument dates back to February 1946 with his "Long Telegram." The "X" article marks the argument's public debut.

expansionist powers, was 'animated by a new fanatic faith, antithetical to our own, and seeks to impose its absolute authority over the rest of the world.'"[46]

In 1947, America was struggling through a post-war recession. Given the economic strains as well as the international uncertainty, Kennan's "containment" argument fell upon receptive ears. Not only was it a more cautious approach in the fog of an emerging Cold War, but it was also considerably cheaper to execute. Through the late 1940s, Kennan's argument held the upper hand. While the Nitze position would eventually give containment its teeth, it wasn't until after North Korea invaded in June 1950 that America would find reason to reinvest substantially in its military.

Naturally, this debate shaped the decisions of America's post-war defense posture. The need for fiscal restraint imposed severe limits on defense spending. In the wake of the 25 July 1947 National Security Act, both the Truman administration and the Republican-held Congress independently began the search for an economically feasible force structure with which to "contain" Soviet expansion. Strategic air power, in the form of a nuclear capable "air force in being," provided an integral part of the answer.

After six months of hearings, in January 1948 the Finletter Commission put forth the Administration's position. Chaired by former State Department attorney Thomas K. Finletter, its report was titled "Survival in the Air Age." "We need a new strategic concept for the United States," it argued.

> This strategic concept must be based on air power…. What we must have and can support is a reasonably strong defensive establishment to minimize the enemy's blow, but above all a counteroffensive *air force in being* which will be so powerful that if an aggressor does attack, we will be able to retaliate with the utmost violence and to seize and hold the

[46] "NSC-68," 14 Apr. 1950, in *Foreign Relations of the United States*, 1950, vol. 1, pp. 234-292. Quotes from pp. 234, 237, 285, 291, as cited by McDougall, 104.

> advanced positions from which we can divert the destruction from our homeland to his.[47]

Two months later, the Republican-held Congress released the findings of its Aviation Policy Board, a joint bipartisan study conducted under the chairmanship of Maine Senator R. Owen Brewster. Surprisingly, there was very little disparity with the administration’s position. While the Congressional position was somewhat critical of Truman's for its general lack of detail, the Brewster Report also agreed that the best deterrent against Soviet expansion was strategic air power. The agreement went further still. Both recognized the requirement to spend the money to develop and reach the target of a 70-group strong strategic Air Force by 1953.[48] Former Secretary of War Robert P. Patterson's official testimony from the previous fall summed up the consensus within the American government: “...we will not need the strongest Army in the world or the strongest standing Navy in the world, but we will need the strongest Air Force in the world.”[49]

Naturally, the three military services received the resolution of the late-1940s force structure debate differently. For the Army and Navy, there was natural cause for deep concern. It was clear, in the period of austere budgets, that the nature of the force structure arguments meant the tax for building the nation's strategic air power capability would likely be extracted from within the defense budget. Indeed, according to the Brewster Report’s projections, the monetary requirements to reach a 70-group strategic

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[47] “Survival in the Air Age: A Report by the President's Air Policy Commission” (Washington, D.C.: Government Printing Office, 1948), in Emme, 616. Also cited in Robert Frank Futrell, *Ideas, Concepts, and Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base, Alabama: Air University Press, December, 1989), 228-229. Emphasis mine.

[48] Walton S. Moody, *Building a Strategic Air Force* (Washington D.C.: Air Force History and Museums Program, 1996), 162-166, and McDougall, 88.

Air Force by 1953 meant that airmen would be receiving about one-sixth of the total national budget. Given Truman's forecasted defense spending plans, the Air Force would require more than half of the projected defense dollars.[50] To airmen, however, these projections were naturally welcome news, solidifying the efficacy of air power during the crucial period of their emergence as an independent force. Consequently, interservice rivalry for money became intense and much of it found expression in terms of service roles and missions.

THE KEY WEST AGREEMENT

The National Security Act of 1947 established the division of the three services around land, sea, and air forces but did little to address the "nuts and bolts" of each service's responsibilities. In an attempt to "resolve" these critical unanswered questions, the first Secretary of Defense, James Forrestal, called the service chiefs together on 11 March 1948 for four days of historic deliberation. Named after the location where these discussions took place, the Key West Agreement was signed by the president on 21 April and established a foundation for the service's functional responsibilities.

Of interest in this agreement, with respect to this study's focus, were three somewhat innocuous omissions. First, the guided missiles controversy, now four years in existence between the Army and the Air Force, was nowhere addressed. The Joint Chiefs agreed that "strategic air warfare" was the functional responsibility of the Air Force. The Navy was able to keep a strategic attack "foot in the door" by retaining the ability "to conduct air operations as necessary for the accomplishment of objectives" consistent with their

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[49] Verbatim report, 6th Meeting of the Air Board, Sep 9-10, 1947, p. 220, RG 340, Air Bd, Mins of Mtgs, 1946-1948, Box 18, MMB, NA, as cited in Moody, 166.

[50] Moody, 166.

primary function of gaining and maintaining general sea supremacy.[51] Nothing, however, was mentioned of the Army's role in long-range warfare.

Second, there was an interesting omission concerning the service assigned reconnaissance responsibilities. Key West gave the Navy primary responsibility "for *naval* reconnaissance... including the air aspects thereof." The Air Force's only mentioned reconnaissance mission was imbedded in its primary function "to furnish close combat and logistical air support to the Army, to include...aerial photography, [and] *tactical* air reconnaissance,..."[52] The role of *strategic* reconnaissance appeared nowhere in the document. Finally, the Key West Agreement never mentioned the word "space."

The latter omission is explainable simply from the fact that as of spring 1948, America possessed nothing remotely close to an operational space capability. Clearly, all three services saw potential in this capability, but to expect the topic of space to arise in a four-day deliberation on more pressing issues was unrealistic. The second omission concerning strategic reconnaissance, however, is not so easy to explain.

Recall that in early 1946, an interservice conflict over strategic reconnaissance had surfaced with the Navy's proposal for a joint satellite program. The Air Force's response then was clear—the reconnaissance capability of satellites represented an "extension" of strategic air power. Conflict between the two services however flared again "in

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[51] "Secretary Forrestal Announces Results of Key West Agreements, 26 March, 1948," (n.d., located in Air University Library, Maxwell AFB, Alabama) 12, 9. The resulting potential ambiguity between the Air Force and the Navy over which service "owned" the strategic attack role was clarified in a subsequent amendment to the Key West Agreement that appeared three months after the original agreement was signed. On 1 July 1948, Secretary Forrestal issued a memorandum for record that said "the Navy's requirement for...forces...would not be the basis for the development of a strategic air force. On the other hand the memorandum also included the statement that 'although strategic air warfare was assigned to the Air Force as a primary function, it was agreed that the Navy should not be denied the air necessary to accomplish its mission.'" (Quoted from "Chronology of Changes in Key West Agreements, April 1948 - January 1958," prepared by the Historical Section, Joint Chiefs of Staff on 7 February 1958, 9. Available at Air University Library, Maxwell A.F.B, AL, Document Section, M-U 40592-92).

December 1947, when the Navy formally submitted to the [Defense Department] Research and Development Board a claim for exclusive possession of rights to satellite development."[53] This move by the Navy prompted the following Air Force policy statement from Deputy Chief of Staff General Hoyt S. Vandenberg on 15 January 1948, *just two months prior* to the service Chiefs' conference in Key West:

> The United States Air Force (USAF), as the service dealing primarily with air weapons—especially strategic—has the logical responsibility for the satellite. Research and Development will be pursued as rapidly as progress in the guided missiles art justifies and requirements dictate. To this end, the program will be continually studied with a view to keeping an optimum design abreast of the art, to determine the military worth of the vehicle—considering its utility and probable cost—to insure development in critical components, if indicated, and to recommend initiation of the development phases of the project at the proper time.[54]

The Navy withdrew its claim on satellites the following day.[55]

It is difficult to determine the motives behind a decision not to address an issue. One can surmise, however, that the Navy may have seen its responsibility for *naval* reconnaissance as extending logically into satellites just as likely as the Air Force saw its satellite claim as an extension of its responsibility to conduct *strategic* aerial warfare. Either perspective, the Navy's or the Air Force's, would have had nothing to gain by raising the discussion at the Key West bargaining table. Because General Spaatz, who together with LeMay in 1946 developed the Air Force position on satellites, was in Key West holding the Air Force position, one can only wonder what might have gone on, or did not, in his mind concerning this problem. Over the next twelve years, in subsequent amendments to the Key West Agreement, the issue would never arise. Instead, the role

[52] "Chronology of Changes in Key West Agreements," 10, 12. Emphasis mine.

[53] Perry, 30.

[54] Perry, 23.

of strategic reconnaissance eventually would fall to an entirely different organization outside of the three services. Alternatively, the controversy surrounding guided missiles subsequently did receive a great deal of attention following the initial Key West agreement.

The question of guided missile control may have been left out intentionally. Certainly, the interservice discussions of the previous four years, beginning with the McNarney memo of October 1944, had not resolved the issue. It is likely the question was put to the side. It was hardly forgotten, however. Over the next eight years, six amendments to the Key West agreement would cross the secretary of defense's desk before it was resolved. In the interim, the Army continued to extend the range of its "artillery."

INTERSERVICE TECHNOLOGY DEVELOPMENTS

The Army's rocket program was able to garner enough support to continue through the lean resource years of the late 1940s. The ORDCIT/Project Hermes team had made national headlines in the spring of 1946 with their publicized launch of the first "American made" V-2. Testing and refinements in the three-year interim had brought their rocket capabilities along to a point where they were once again ready to make a significant mark on history. On 24 February 1949 von Braun's team fired a V-2-modified *WAC Corporal* 244 miles into the sky. Their rocket became the first man-made object ever to enter space.[56] While the altitude attained was considered by many to be a

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[55] Perry, 30.

[56] Launius, ed. Logsdon, 14; and Spires, 17.

remarkable achievement, to others, 244 miles "up" easily translated to some similarly long distance "out."

Five months earlier, in September 1948, the Department of Defense (DoD) had circulated a policy that worked to frame the missile control issue for the first time in terms of operational, rather than technological, characteristics. Though never articulating a distance, the policy declared that the Army would be responsible for "tactical" missiles while the Air Force assumed the same for "strategic" missiles.[57] Nine months following the historic *WAC Corporal* launch, the Key West Agreement received its first two secretary of defense-approved amendments concerning guided missiles. The first appeared on 17 November 1949 addressing "short-range surface-to-surface" systems. It stated that "guided missiles which supplement, extend the capabilities of, or replace the fire of artillery will be the responsibility of the U.S. Army and the U.S. Navy as required by their functions." Five months later, a second amendment followed to clarify further that "surface-launched guided missiles which supplement, extend the capabilities of, or replace Air Force aircraft will be the responsibility of the U.S. Air Force."[58] Still, enough ambiguity remained so that Army Ordnance continued its work undeterred.

In April 1950, having expended the last of their V-2 stock, Project Hermes closed its doors at White Sands once and for all. Von Braun and his team relocated to Huntsville, Alabama's Redstone Arsenal and helped activate the Army Ordnance Guided Missile Center. By the end of Truman's term in office, the *Redstone* missile was approaching the capability of sending a small warhead 500 miles downrange.[59]

[57] Spires, 19.

[58] "Chronology of Changes," 12, 14.

[59] Launius, ed. Logsdon, 15.

The Navy's recourse to the international security elements present in the late 1940s took on somewhat of a different character. The Navy's problem, however, was fundamentally different. While the Army, as the nation's land force component, could feel relatively secure in its most basic mission, the Navy's Mahanian blue water force found itself in the post-World War II environment without a comparable enemy. The great navies of the world that posed any threat to America had been soundly disposed of in the war. The Soviet Union was still far from mounting a challenge to American naval supremacy on the high seas. The findings from the Finletter and Brewster Reports only confirmed this reality. Consequently, the Navy's strategy to acquire a relevant mission took on a more immediate character.

With the established role for naval air power that emerged from their experience in the Pacific campaign of World War II now legitimized in the Key West Agreement, the Navy sought to extend its maritime reach with the supercarrier concept. A 65,000-ton aircraft carrier that could support heavy bomber operations was a logical and intellectually supportable concept from a perspective of sea power theory. Despite the Air Force's established and reaffirmed ownership of strategic attack (see footnote #51, p. 77), Secretary Forrestal supported the concept. In his diary he noted, "I was against the development of a new fleet of supercarriers by the Navy but I felt it was most important that one such ship, capable of carrying the weight of a long-range bombing plane, go forward."[60]

Ultimately, the *USS United States* never sailed. With a projected price tag of $188 million it was economically unsupportable given the existing budget-austere

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[60] Walter Millis, ed., *The Forrestal Diaries* (New York: Viking Press, 1951), 467, as cited in Futrell, 199.

environment. After conferring with Generals Bradley, Vandenberg, and Eisenhower, and finally President Truman, on 23 April 1949 Defense Secretary Louis A. Johnson, Forrestal's replacement, issued orders to terminate its construction.[61] However, the interservice threat to the Air Force's role of strategic attack, posed by the supercarrier during its two-year life span, represented a fundamental challenge to airmen and resulted in a major counter-effort to defend the development of its B-36 strategic bomber as a more economical and viable alternative.

Amidst this larger and more immediate battle between sailors and airmen, the Navy's two unimposing space-related programs quietly took divergent paths. After failing to win interservice support in May 1946 for its satellite proposal, and backing away from an independent claim on satellites in January 1948, the Navy's satellite program languished in a funding drought before getting officially "shelved" toward the end of the year.[62]

NRL's Viking missile program, however, managed to survive. Still focusing on basic exoatmospheric research in its three-year effort thus far, the primarily civilian Viking program developed the first all-aluminum structure, pioneered a gimbaled motor for thrust vector control, and successfully launched their first rocket, the *Viking 1*, at White Sands on 3 May 1949. By January 1953, eight additional rockets had been fired, the highest, *Viking 7*, reaching an altitude of 136 miles.[63]

AEROSPACE LOST

Within the Air Force, the aerospace concept suffered considerably in the three years following the service's independence. The concept's institutionalization, especially at

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[61] Futrell, 248.

[62] Spires, 27.

[63] Rosen, 236.

this early stage in its life, was extremely dependent upon the focus of Air Force leadership. However, in addition to geopolitical and interservice environmental pressures drawing leadership attention to more immediate issues, there were pressing problems *within* the fledgling service as well. The cumulative effect of these saw Arnold's vision of the Air Force future weakening during this period to von Kármán's.

Immediately before service leadership laid the task of building an operationally ready strategic attack force to meet America's defense requirement. At the end of 1946, the nation's atomic "stockpile" totaled nine unassembled bombs. By the time the Air Force achieved its independence, this figure had risen to thirteen.[64] Furthermore, five months into its existence, the Air Force possessed only two qualified weapon assembly teams and it was "estimated that, once a bomb was ferried to a combat base, it would take sixty hours to have it loaded in a B-29 and ready to go."[65] Complicating the strategic attack force issue were the developmental requirements of the aerial refueling and fighter escort force necessary to support it.

For a new service, facing this sort of challenge and operating on a budget designed only to develop a nuclear capable, 70-group "force in being" by 1953, the aerospace-related resource allocations naturally took a beating. Prior to its independence, the Air Force's R&D budget for missile development saw a dramatic increase from 1945 to 1946, jumping from $3.7 million to $28.8 million in support of twenty-six different programs. For fiscal year (FY) 1947, the service projected an additional increase to $75.7 million. "Instead, the President's austerity plan cut back missile R&D to $22 million. Eleven

[64] Moody, 126.

[65] Moody, 129.

programs died at once."[66] The programs that did survive were those expected to become available the soonest—the Air Force's air-breathing cruise missiles. Because ballistic missiles did not appear to have any promise for the next 8 to 10 years, Convair's contract for a long-range ICBM, awarded just fifteen months earlier, was among the first to go.[67] In July 1947, barely a year after its introduction, the Air Force's only ballistic missile program was cancelled.

Satellite stock suffered in the resource crunch as well. In December 1947, the Air Materiel Command (AMC) reviewed the accumulating number of RAND papers and issued a report that affirmed the technical feasibility of the reconnaissance satellite but questioned both its military utility and the high cost of building one. "Constrained by 'scarce funds and limited component scientific talent,' [the report concluded that] the Air Force should not risk supporting a satellite development program when guided missiles deserved research funding priority."[68] The position was certainly supportable given the fact that at its core, the Air Force was a strategic attack force. Furthermore, the satellite was a terribly expensive system to perform a role that aircraft were currently capable of performing. Thus, satellites took a back seat to all other space-related R&D projects in the Air Force. AMC's report, however, did recommend that RAND's conceptual research should continue.

At the time, the decision to support further RAND's satellite studies—especially given the satellite's low priority in the Air Force's schema—was a rather insignificant, albeit encouraging sign in support of the aerospace concept. The benefit of historical

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[66] McDougall, 97. Futrell, on p. 482, cites the FY 1947 Air Force missile budget figure even lower ($13 million).

[67] Neufeld, 48.

hindsight, however, offers an alternative perspective. Sufficiently armed with the technological confidence that a satellite was realistically *feasible*, RAND analysts began to build a stronger argument for *why* it should be pursued. Over the next three years, the think tank produced a series of papers that culled the satellite's prospective utility. A RAND interim summary conference in 1949 shed light on the character of the developing argument. Emphasizing the passive satellite roles of communications and reconnaissance, RAND argued that a satellite could serve a major element of *political* strategy as an intelligence provider. The conferees concluded that "no other weapon or technique known today offers comparable promise as an instrument for influencing Soviet political behavior."[69] RAND's argument reached its full maturity the following year with the publication on 4 October 1950 of RM-567, "The Satellite Rocket Vehicle: Political and Psychological Problems," by RAND psychologist, Paul Kecskemeti.

This obscure report—not typically cited in Air Force historical studies that pertain to this period—dealt with the "probable political effects resulting from the launching of a satellite vehicle under United States auspices." Kecskemeti's thesis was simple, but critically important: "because of the political implications of the satellite instrument, it is of prime importance what we *say* about it, in addition to what we *do* with it."[70]

Kecskemeti's paper cautioned against conducting all satellite operations under a shroud of secrecy. Public acknowledgement of American satellite activities would not only garner political prestige among allies and neutral nations, but more importantly, *it*

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[68] Spires, 26.

[69] Merton E. Davies and William R. Harris, *RAND's Role in the Evolution of Balloon and Satellite Observation Systems and Related U.S. Space Technology*, R-3692-RC (Santa Monica, CA: The RAND Corporation, September 1988), 9-19, as cited in Spires, 27-28.

[70] Paul Kecskemeti, *The Satellite Rocket Vehicle: Political and Psychological Problems*, RM-567 (Santa Monica, California: The RAND Corporation, 4 October 1950), v, 5.

would maximize the nation's political leverage against the Soviets. The ability to openly conduct "successful reconnaissance operations… would result in a significant political payoff…. If the Soviet leaders were to realize that [their] secrecy had been lost,… [this] loss of secrecy would increase the effectiveness of deterrence, [and] would also contribute to the effectiveness of direct political pressure upon the Soviet Union." But Kecskemeti also recognized that "satellite operations designed to gather visual information in Soviet territory, if they become known to the Soviet leaders, will be construed by them as a 'consummated act of aggression.'" However, since technical and physical limitations exist such that the satellite is unable to carry a warhead, it therefore "cannot be considered as a weapon." Thus, to counter the likely Soviet reaction, he recommended that America publicly promote "the 'peaceful' nondestructive nature of the satellite [with] emphasis placed on the scientific and technological achievement which a successful 'artificial moon' represents." Kecskemeti concluded with a plan of action favoring "advance publicity rather than secrecy, as well as the launching of a first experimental satellite over the Equator [to establish a non-sovereignty precedent for outer space]." Subsequently, "a second one [could be launched] on an oblique orbit to be used for intelligence purposes."[71]

Kecskemeti's treatise was remarkably prescient, enough so that within five years time it would come to have a direct influence on national policy. Unfortunately, in Air Force circles, where satellite operations appeared still far out on the horizon, his analysis of the political and psychological implications of these operations were likely considered somewhat premature. In October 1950, given an Air Force focused long-term on

[71] Kecskemeti, v-19.

strategic attack and short-term on the Korean conflict, Kecskemeti's paper likely became "lost in the shuffle." A staff memo would surface in December 1952 referring to (but missing) the paper's point. Otherwise, however, there is little evidence that Kecskemeti's work ever had much influence within the Air Force. Ironically, by 1950, the Air Force's own research team had built an intellectual argument that remained unrecognized within the organization, but would a decade later severely rein in the aerospace concept.

One final encouraging sign within the Air Force with respect to the concept during this period was a critical decision to complete the organizational rearrangement started by Arnold in late 1945. In 1949, the Air Force initiated two independent studies—one a SAG-sponsored panel headed by Dr. Louis N. Ridenour and the other an Air University review—to assess the Air Force's R&D organizational structure. Both groups concluded that the Air Force should move all R&D responsibilities out from under the auspices of AMC. The development of future technology, essential to the continued well-being of the service, struggled in competition against AMC's primary focus of day-to-day logistics. Consistent with these findings, on 23 January 1950, now Chief of Staff General Vandenberg established the Air Research and Development Command (ARDC).[72] The restructuring would better facilitate the development of the aerospace concept's advanced technologies. Although there was still no recognition given to the close relationship between ICBM and satellite development, the Air Force's aerospace-enabling technologies, and by extension the concept itself, now had a new and organizationally more powerful home.

[72] Futrell, 276-278.

From 1947–1950, external and internal contextual pressures upon the Air Force offered scant room for further development of the aerospace concept. The momentum-sustaining technological advancements pushing the concept along existed on paper, and, with regard to satellites, even continued to develop somewhat. Lacking, however, was an affluent financial environment within which these technologies could evolve into hardware. Budget austerity had beset Arnold's far-reaching vision with an acute case of near-sightedness. However, two geopolitical events occurred toward the end of this period that offered new fiscal life to a concept virtually neglected over the previous three years. In August 1949, the Soviets successfully tested the atomic bomb and in June 1950, the North Koreans launched an invasion intended to unify the Korean peninsula.

AEROSPACE RECOVERED?

These two events generated two significant responses from the American government that in turn reestablished an environment conducive to the development of the aerospace concept. After the Soviets demonstrated the possession of a nuclear capability, the character of the Kennan-Nitze security strategy debate began to change. The defense force deemed sufficient in 1947 to "contain" Soviet aggression fell subject to critique. When North Korea invaded in June 1950, hard-line strategists garnered even more political leverage. It was only three months until Paul Nitze's report calling for the "rapid and sustained build-up of the political, economic, and military strength of the free world" was converted into national security policy. When it entered history in September 1950 as NSC-68 defense spending tripled.[73]

[73] McDougall, 104.

NSC-68's influence was immediate. In the wake of the Korean invasion and consistent with the new policy, Congress approved huge increases in appropriations to the Defense Department. A portion of these funds flowed into the Air Force's R&D budget, increasing its FY 1950 allocation of $202 million to $463 million the following year.[74] ARDC's newly acquired wealth, in turn, provided the resource conditions necessary within which the aerospace concept could again be revived.

Second, with a threat of Soviet nuclear parity now apparent, Truman felt compelled to maintain an American advantage. On 31 January 1950, he authorized the commencement of thermonuclear research and testing. Within eighteen months, atomic physicists verified its feasibility and proved it in November 1952 with the first successful detonation of a thermonuclear device.[75] Converting this device into a warhead would require still more time but the promise of a fusion weapon, both more powerful and lighter than its fission predecessor, relaxed significantly the thrust and accuracy requirements of a nuclear-capable ballistic missile. Thus, hydrogen bomb development breathed new life into the Air Force's ICBM advocates. In January 1951, ARDC reopened a contract with Convair, killed three and a half years earlier, to again study rocket propulsion options.[76] Research interest in satellite reconnaissance, however, remained subdued, in large part because of the influence of Colonel Richard S. Leghorn.

Colonel Leghorn flew World War II reconnaissance missions over Normandy in preparation for the Allied invasion and left the service following the war's conclusion,

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[74] Department of Defense, Office of the Under Secretary of Defense (Comptroller), "National Defense Budget Estimates for FY 2003," March 1958, 160 (table 6-18). Figures presented here are "current dollars" representing a real growth of 118.7 % - by far the largest percentage increase in R&D funding ever, then or now.

[75] Beard, 142.

[76] Spires, 23.

but not before having established his reputation as an integrative thinker on reconnaissance. It was his reputation and experience that in April 1951 recalled him to active duty during the Korean War. Leghorn was made the chief of ARDC's Reconnaissance Systems Branch and assigned to review the Air Force's reconnaissance requirement and procurement plans.[77] In three months time, he submitted an initial report titled, "Comments on Intercontinental Reconnaissance Systems, 1952-1960." Leghorn's assessment of the Air Force's future reconnaissance requirements was not unlike that expressed in General Arnold's vision five and a half years before.

> A short intense campaign as contemplated by SAC requires the collection of as much planning information as possible prior to "D"-Day. As the SAC striking capability improves with improved development and production of atomic weapons and high performance, invulnerable vehicles, need for Pre-"D"-Day intelligence assumes even greater relative importance.…
>
> Vehicles for Pre-"D"-Day Reconnaissance must meet the following requirements:
>
> 1. Minimum chances of detection.
>
> 2. Minimum chance of interception.
>
> 3. An unmanned vehicle is greatly preferred.
>
> 4. The vehicle configuration must lend itself readily to a "cover plan" excuse such as a scientific or weather mission gone astray.
>
> Whether or not the State Department will acquiesce in the use of any of these vehicles, the Department of the Air Force must fully develop a technical capability for Pre-"D"-Day Reconnaissance.[78]

However, when the report went on to survey the reconnaissance vehicle possibilities available to the Air Force, of RAND's Earth Satellite option, Leghorn concluded "[the]

[77] Davies, 31, 39.

[78] Richard S. Leghorn, Colonel, Memorandum, Reconnaissance Systems Branch, "Comments an Intercontinental Reconnaissance Systems, 1952-1960," Wright Field, Dayton, Ohio, 10 July 1951, 54 WCLF-286, 1, as cited in Davies, 37.

concept does not offer sufficient promise today to justify the expenditure of development funds by the Air Force." Thus, he held firm on AMC's 1947 position for continued but limited studies, advocating instead that the Air Force pursue such options as guided missiles, balloons, drones, and manned aircraft—all of which could achieve intercontinental capability through B-36 air launching or in-flight refueling.[79]

His work caught the attention of the Air Staff and in the fall of 1952, Colonel Leghorn moved to the Development Planning Office at the Pentagon on a "by-name" transfer request from the office's director, Colonel Bernard A. Schriever. Here, Leghorn began work on a broader vision, developing the technical and political strategy requirements for what he described as "Pre-D-Day intelligence." He also became the Air Force's principal liaison officer with RAND on long-range reconnaissance requirements.[80] Both his work and his exposure to RAND would have significant influence on this story in the coming years.

Meanwhile, as new resources flowed into the Air Force and signs of a renewed interest in pursuing ballistic missile technology emerged, the broader and more immediate requirement to support a limited war in Korea while maintaining a global strategic attack capability continued to focus Air Force leadership on near-term issues. Consequently, while the ground became financially fertile once again to enable airmen to resume pushing their operational domain outward, the visionary encouragement necessary to pull this concept along remained somewhat blurred.

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[79] Davies, 37, 38.

[80] Davies, 33.

Indicative of the Air Force's focus as Truman's presidency came to a close is the following excerpt from a telling *Saturday Evening Post* article appearing on 17 February 1951. "Believing that the American people needed to know the facts about the nation's air power, and the relationship of the Korean War to global responsibilities," Air Force Chief of Staff General Vandenberg published "The Truth About Our Air Power."[81] In it he wrote:

> In the Atomic Age, more than ever before, a strong offense is the best defense. ...
>
> Our stockpile of A-bombs is not the sole deterrent to aggression. It is our ability to deliver the bomb anywhere in the world that has been forestalling international communism's avowed design for world domination. Our strategic air power, poised to ram the atomic bomb down the throat of an aggressor in the event it is used against us, has been the cork keeping communism from spilling over the democratic nations.
>
> The muscle of our strategic air arm is the B-36, which has more speed, range, armament and carries a heavier bomb load than any big plane in operation today.[82]

General Vandenberg's article offered the American public no vision of an Air Force future in rockets or satellites. Instead, it was partly an educational piece about the uniqueness of air power, partly an advocacy piece for air power's role in the nation's defense, and partly a justification piece for the need to advance the air fleet into jet-powered propulsion. However, Vandenberg was not hiding a formidable assembly of aerospace secrets. By the time that Truman stepped down from office in January 1953, the Air Force's entire "aerospace program" consisted of a collection of in-depth RAND reports on the satellite and a single ballistic missile program that was still two-and-a-half

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[81] Futrell, 300.

[82] Hoyt S. Vandenberg, General, USAF. as told to Stanley Frank, "The Truth About Our Air Power," *The Saturday Evening Post*, 223, no. 34 (17 February 1951), 100.

years away from its first test flight. The Army on the other hand, had already touched space and the Navy was preparing to do the same.

If, in the summer of 1947, the aerospace concept appeared to be taking hold within the Air Force, encouraged by Air Force leaders clearly thinking about the prospect of an operational domain that extended naturally beyond the atmosphere, within three years, the concept had all but died. By the beginning of 1953, though external conditions had developed to offer the potential to revive it, the concept bore little of the momentum it had carried five and a half years earlier. ARDC had become its organizational guardian, but Air Force leadership's focus on space had waned considerably. However, a new president would bring a "New Look" to the forefront. His defense strategy, like Truman's, would rest upon air power and strategic attack. But unlike his predecessor, Eisenhower would find himself in a position to leverage and capitalize on the maturation of the space-enabling technologies that were only thus far emerging. As a consequence, the aerospace concept received a desperately needed kick start. Environmental influences external to the Air Force breathed new life into the concept's institutionalization. Ironically, however, this new president would also craft an alternative worldview for the realm above the earth's surface that by the end of his presidency, would threaten to scuttle for quite different reasons the aerospace concept entirely.

Chapter 4

A Concept Nurtured
(Advanced Habitualization, 1953-57)

For the aerospace concept's institutionalization within the Air Force, President Eisenhower's arrival to the oval office proved both a blessing and a curse. On one hand, he implemented a security strategy that created the perfect environment within which the service's aerospace-encouraging aspirations could emerge. On the other, in his pursuit for peace he crafted a policy that threatened to make the idea conceptually irrelevant. This chapter traces in detail the five-year period bounded by Eisenhower's election in late 1952 and the eve of the Soviet Union's launch of *Sputnik* in October 1957 during which both of these themes develop and impend conflict.

In terms of the institutionalization process this study examines, during this timeframe, the aerospace concept moved through an advanced stage of habitualization. Structural arrangements appeared and became formalized within the Air Force, and through them the idea that air and space are one further penetrated the organization. Concurrently, however, a new wrinkle in the service's environmental context began to emerge that in time would come to impede this process significantly.

The historical paths through these events is complex, intermingled, and in many ways ironic. Understanding their ebb and flow, however, lends support to the broader arguments this study suggests. To establish the underlying context upon which these paths unfold, this chapter opens with a discussion of the Eisenhower Administration's Cold War strategy. Next, the narration explores how this strategy found expression within the Air Force by allowing aerospace-enabling programs to begin their movement from paper to hardware. The chapter's first section then closes with a detailed examination of what is one of this study's critical junctures: a series of events and decisions that transpired within the Administration between early 1954 and December 1955 from which President Eisenhower cobbles together the early framework of his "space for peaceful purposes" policy. Section two examines the interservice context that develops during this period, and then returns to the Air Force perspective to describe how its organizational expansion toward space continued to mature through the mid-50s. The chapter concludes by looking at the public debut of Eisenhower's space policy and the not-for-public Cold War picture that the president was building in the days leading up to the dramatic Soviet satellite launch.

THE "NEW LOOK" GIVES AEROSPACE A NEW PUSH (1953-55)

The Eisenhower Administration sowed a fertile ground for the aerospace concept. The "New Look" placed a premium on state of the art defense technology and gave top priority to strategic nuclear attack forces. Consequently, during the opening two years of Eisenhower's first term, the Air Force's aerospace-enabling technologies moved from feasibility studies into substantive programs. Indeed, the ICBM even found its way to the top of the nation's developmental priority list. But from the new president's past also came an acute understanding that generals fight the wars statesmen fail to prevent.

Underlying Eisenhower the *statesman's* Cold War strategy was a quest for peace, and if not that, then at the very least a more relaxed state of tension between the two superpowers. From this desire came his vision for space, which was fundamentally different from the Air Force's. Inklings of this new vision began to appear as early as 1954. But its ideological foundations were apparent from the outset of his tenure.

EISENHOWER'S COLD WAR STRATEGY

The national security strategy of the Eisenhower Administration took shape during the presidential transition in late 1952. The president-elect and key members of his cabinet imagined that the United States was caught within a complex strategic dilemma. Backing down from the communist challenge, especially now, given the Soviet Union's emerging capacity to wage nuclear war, threatened the survival of the Free World. But the alternative of confronting Communism meant engaging in the Cold War arms race, which only posed a different pair of bleak futures. One future, if arms race tensions cascaded into open hostilities, could physically destroy America. The other, which avoided hostilities but saw the arms race spiral out of control, would gut America's economy. In thirty years, government spending had grown from $4 billion to $85.5 billion per year, 57.2 percent of which defense alone now absorbed. Defending America endangered the nation's economy as much as not doing so endangered the security of the entire Free World.[1]

Eisenhower's security policy sought to mitigate this quandary. America would prepare for the long haul, optimizing the health of the economy by keeping the essential,

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[1] Walter A. McDougall, *...the Heavens and the Earth: A Political History of the Space Age,* (New York: Basic Books, 1985; Baltimore: The Johns Hopkins University Press, 1997), 113.

but least costly military forces.[2] The president's "New Look," embodied in policy in October 1953 under NSC 162/2, accepted an inferior conventional military force and offset the Soviet threat with an emphasis on nuclear strategic striking power and technological superiority.[3] The strategy's centerpiece was "Massive Retaliation."

Defense spending was slashed. The plan called for a simultaneous "demobilization of a quarter of all men under arms and a drop in military spending of 30 percent over four years! The only service spared was the USAF, which offered 'more bang for the buck.'"[4] At first glance, the strategy's general character, with its air power centric approach, was not unlike Truman's of six years earlier. Peering more deeply, however, the two differed fundamentally, for hindsight makes clear that Eisenhower was committed to addressing the Cold War's more basic dilemma of the balance between confrontation—arms race or otherwise—and peace.

The president knew from the outset that his New Look policies, which were "designed to minimize the impact of the Cold War on domestic life, also pushed the country further along the road to technocracy."[5] A deep concern to avoid this compelled him, during the course of his presidency, to develop his security strategy within a broader strategy for peace. Indeed, this broader strategy's logic and philosophical foundations are apparent in Eisenhower's first public address as president. On 16 April 1953, with the opportunity afforded by Stalin's death, the president delivered his "Cross of Iron" speech.

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[2] McDougall, 113.

[3] Matthew J. von Bencke, *The Politics of Space: A History of U.S.-Soviet/Russian Competition and Cooperation in Space* (Boulder, Colorado: Westview Press, 1997), 11, and David N. Spires, *Beyond Horizons: A Half Century of Air Force Space Leadership,* (Peterson AFB, CO: Air Force Space Command, Spring 1995), 29.

[4] McDougall, 114.

He described the Cold War, with its resulting arms spiral that threatened the entire world, as both tragic and ironic.

> What can the world, or any nation on it, hope for if no turning is found on this dread road?
>
> The worst to be feared and the best to be expected can be simply stated. The worst is atomic war. The best would be this: a life of perpetual fear and tension; a burden of arms draining the wealth and the labor of all peoples; a wasting of strength that defies the American system or the Soviet system or any system to achieve true abundance and happiness for the peoples of this earth.
>
> Every gun that is made, every warship launched, every rocket fired signifies, in the final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed. This world in arms is not spending money alone. It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children. ….
>
> This is not a way of life at all, in any true sense. Under the cloud of threatening war, it is humanity hanging from a cross of iron.…
>
> So (to) the new Soviet leadership… We welcome every honest act of peace. We care nothing for mere rhetoric. We care only for sincerity *of peaceful purpose attested by deeds*. The opportunities for such deeds are many.[6]

Eisenhower *the general* saw the Cold War transforming America into the image of her enemy. Eisenhower *the statesman* came to envision his place in history secured by finding a peaceful solution to this ideological quagmire.

From the beginning of his presidency, Eisenhower sought a vehicle that might enable both sides to pull back from the threat of violent confrontation. In two years time, "space for peaceful purposes" would begin to emerge as that vehicle. But the path to

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[5] McDougall, 114. OED defines "technocracy" as "the control of society or industry by technical experts." McDougall's definition (p.5) is a bit more specific: "the institutionalization of technological change for state purposes, that is, …state-funded and –managed R&D."

[6] Dwight D. Eisenhower, "The Chance for Peace," Address delivered before the American Society of Newspaper Editors, 16 April 1953; republished in Martin J. Medhurst, *Dwight D. Eisenhower: Strategic Communicator* (Westport, Connecticut: Greenwood Press, 1993), 167-169. Emphasis mine. Some excerpts also cited in McDougall, 114.

secure it would be a delicate one. Only four months after delivering his early hopes, the Soviet Union successfully detonated Joe-4, a device which *they* claimed was the world's first thermonuclear bomb.[7]

AEROSPACE REINVIGORATED

Within a burgeoning Air Force not yet six years old, the new president's security policy fell on welcome ears. Capturing this sense was the Air Force Vice Chief of Staff, General Thomas D. White, who, just over a year into Eisenhower's term wrote:

> We have recognized… our atomic weapon developments form the only effective counter to the overwhelming mobilized manpower of the Soviets. Our Air Force with its ability to deliver nuclear weapons has been recognized as an instrument of national policy…. [There]is an awareness of the simple but subtle fact that modern air forces can be a controlling influence in the world power situation.[8]

Eisenhower, like Truman, held strategic attack as the cornerstone to America's defense. Under "Massive Retaliation," rockets would proliferate, and new organizational structures would develop around them, through which the aerospace concept would find room to secure a stronger hold within the Air Force.

The "New Look" gave a substantial boost to three aerospace-enabling technologies in particular. The ICBM's swift response capability, potency, and relative immunity from attack handed missile advocates a strong argument to pursue its further development. Additionally, given the anticipated nature of war under this strategy, the Air Force began to recognize a need for accurate targeting intelligence *prior to* the initiation of hostilities. Thus, the reconnaissance satellite also profited from the New

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[7] Von Bencke, 207; and McDougall, 55. In fact Joe-4 was a thermonuclear device similar to the one America successfully tested in November the year prior. The USSR would not have a deliverable H-Bomb until November 1955; the US, May 1956.

Look environment. However, despite both of these aerospace systems being under the broad roof of ARDC (the service's R&D command), they continued to develop separately—the ICBM garnering the higher priority as a critical asset for strategic attack, the satellite, as an expensive support asset, sitting significantly lower in importance. Also during this period, a third system emerged within ARDC to capitalize on hypersonic boost-glide technology. This system held promise as an aerospace vehicle in the truest sense. It would be capable of operating throughout the aerospace regime. All of these developments occurred within the Air Force during the first two and a half years of the Eisenhower Presidency and began almost as soon as he took office.

The ICBM. Shortly following Eisenhower's inauguration, Harold E. Talbott, the newly appointed Air Force Secretary, directed Trevor Gardner, his 37-year old Special Assistant for R&D, to undertake a study of the military's guided missile programs.[9] Gardner had participated in the Manhattan project during WW II. He was smart, energetic, had a penchant for working around bureaucratic friction, and soon became convinced of the critical need to develop the ICBM.

In November 1953, Gardner gathered a group of scientists and engineers into what became informally known as the Teapot Committee. Studying the influence of thermonuclear technology on missile development and assessing Soviet advancements in the field, the committee submitted its report to Gardner on 10 February 1954.[10]

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[8] Gen Thomas D. White, "The Current Concept of American Military Strength," *Air University Quarterly Review* 7, no. 1 (Spring 1954): 3.

[9] Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force 1945-1960* (Washington D.C.: Office of Air Force History, 1990), 95.

[10] Robert Frank Futrell, *Ideas, Concepts, and Doctrine,* vol. 1, *Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base, AL: Air University Press, December, 1989), 489; and Spires, 32. Some refer to this committee as "the von Neumann Committee," named after its chair, Dr. John von Neumann.

The Teapot Report expressed "grave concern" over the strengthening of Soviet defenses against the Air Force's manned bombers. Furthermore, it warned of the growing potential, given their recent advancements in thermonuclear technology, of a Soviet ICBM program. To meet this threat, the Teapot Committee concluded that the Air Force could have an Atlas ICBM operational in 5-6 years *if* the service gave the project its highest priority *and* centralized its development. To facilitate this, the committee recommended consolidating the Atlas program under a new Air Force agency dedicated solely to bringing the missile into service.[11] Armed with the Teapot Report, Gardner began an intensive lobbying campaign within the Air Force and DoD to energize support for ballistic missile development.

It took him just three months to convince the Air Force Chief of Staff. In May 1954, General Nathan Twining moved Atlas to the top of the Air Force's priority list and directed ARDC to establish an independent ballistic missile organization to see this system to fruition. Just two months later, the Western Development Division (WDD) opened its doors in California, conveniently locating the Atlas program near its technology support base. Gardner was also instrumental in selecting the division's first and only chief, Brigadier General Bernard Schriever.[12] General Schriever would serve in this capacity for the next five years, after three of which, *Time* magazine would suggest to the American public that he held perhaps "the most important job in the country."[13] Meanwhile, as the Air Force's long-range strategic attack capability sharpened, so too did its requirement for accurate target intelligence.

[11] Futrell, 490.

[12] Futrell, 490; and Spires, 33.

[13] "The Bird & the Watcher," *Time* LXIX, no. 13 (1 April 1957): 17.

The Reconnaissance Satellite. During the presidential transition period, two memoranda surfaced within the Air Staff that attest to a recognition among Air Force leadership of the growing importance of strategic reconnaissance. The first passed from the commander of the staff's operations directorate to his counterpart in development, and marks the renewal of an organizational interest to move RAND's satellite studies from their drawing boards into an actual hardware program. The second came from a key figure within the development directorate that addressed the Air Force Chief of Staff specifically. It was likely an off-shoot of the first and relates more broadly to the Air Force's developing position on pre-hostility reconnaissance and intelligence. The details of both of these memos merit closer inspection.

On 18 December 1952, the Deputy Chief of Staff for Operations, (then) Lieutenant General Thomas D. White, wrote to his colleague, "There is a requirement for a satellite vehicle capable of orbiting the earth at oblique angles and transmitting terrestrial reconnaissance data from its orbital positions to stations on the surface of the earth." White also made an implicit reference to the Kecskemeti study from two years prior. Beyond just military considerations, he argued that *vis à vis* the Soviet Union, "(h)ighly important political, psychological, and scientific advantages are likewise to be gained from developing and launching the first satellite vehicle."[14] Of particular interest however, is the memo's 5-page background paper accompanying it. Therein General

[14] Lt Gen Thomas D. White, Deputy Chief of Staff, Operations to the Deputy Chief of Staff, Development, "Satellite Vehicles," memorandum, 18 Dec 1952, *Military Uses of Space, 1945-1991*, ed. Jeffrey Richelson, (Washington, D.C.: The National Security Archive and Chadwyck-Healy, 1991), no. 598, Microfiche, 1. White clearly references this RAND study, however unlike Kescemeti, he recommends "Because of the unique military and political implications of such a vehicle, the utmost secrecy should be attached to its development and launching."

White's staff developed a supporting argument that reveals what and how this organizational element of the Air Force was thinking in late 1952.

"It is intuitively clear," his staff argued, "that our present modest effort in this field may be dangerously insufficient in a race for the first satellite." But the issue of being first was not simply with respect to the international environment. This was an interservice concern as well. Their argument continued:

> Within the Department of Defense, the Army, Navy, and Air Forces are all conducting missile and rocket research which could culminate in developments leading to satellite vehicles. The Army is known to be interested in a satellite…. There are grounds for concern when it is considered that the Air Force may lose initiative and leadership to other agencies for a development so closely associated with *our medium* and mission.[15]

Again, as in 1946, at least some of the motivation for the Air Force's organizational interest in satellites arose from concerns that the other services might beat them to the punch. More importantly, however, notice the two words that closed this statement. The term "our medium," represents explicit evidence that by late 1952 the aerospace concept was penetrating the organization at levels below its most senior leaders.

One month later, the second memo of interest emerges, this time from the Air Staff's Development Directorate. Specifically, it was the final report of reconnaissance expert Colonel Richard Leghorn, who, as of January 1953, was nearing the end of his recall to active duty begun nearly two years before (see Ch. 3, pp. 89-91). Submitted to Air Force Chief of Staff General Vandenberg, Leghorn intended to expand upon his 1951 concept of "Pre-'D'-Day Reconnaissance." His paper, however, deserves far more credit, for it established the Air Force's concept of strategic reconnaissance that arguably remains in

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[15] White, "Satellite Vehicles," memo, 4. Emphasis mine.

place still today. The memo's relevance to this study is twofold. First, Leghorn's position implies a distinct functional relationship between strategic reconnaissance and strategic attack, namely, the former *supports* the latter. Second, he adds the satellite to his list of viable future reconnaissance systems.

Colonel Leghorn acknowledged and advocated the Air Force's movement toward a wartime "air strategy of disarmament" that would employ the service's nuclear strategic attack assets against Soviet military forces-in-being, its military stocks, its logistics system, and its economy. But, he cautioned, the Air Force had yet to appreciate the implications of maintaining such a plan.

> Current development planning indicates the probable technical feasibility of such a disarmament concept. *Our qualitative intelligence and reconnaissance capabilities [however] constitute the primary problems*, and without extraordinary action, these might delay adoption at operational planning levels of strategies with emphasis on counterforce operations.[16]

Since a nuclear war would likely be an expedient one, Leghorn reasoned, then it was critical to maintain a robust *peacetime* intelligence and reconnaissance capability. In a war that would demand reaction times measured in minutes, an *accurate* target list was needed *before* the opening of hostilities. Hence, Leghorn's key recommendation, and the legacy he left the Air Force, was to establish an earnest program to develop the systems within the Air Force that could gather and keep current such target information. "Immediate and vigorous steps [should] be taken to strengthen air intelligence and

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[16] Col Richard M. Leghorn, Memorandum for Gen Vandenburg, subj: "An Air War Strategy of Disarmament, and Obsolescence of the 'Strategic Offensive,'" 27 January 1953 (Declas: 24 March 1972) as cited in Merton E. Davies and William R. Harris, *RAND's Role in the Evolution of Balloon and Satellite Observation Systems and Related U.S. Space Technology*, R-3692-RC (Santa Monica, CA: The RAND Corporation, September 1988), 34. Emphasis mine.

reconnaissance capabilities, which will be necessary before any sort of disarmament strategy can be contemplated."[17]

Leghorn's argument resonated and its influence was immediate. Two months after it crossed General Vandenberg's desk, ARDC published its first formal design requirement for a high altitude reconnaissance aircraft capable of operating unchallenged above the Soviet air defense network, with the range to penetrate its vast interior. The requirement marked the genesis of what would evolve, in two years time, into the U-2 program.[18]

But also significant in this memo was Leghorn's reversal of his earlier position regarding the space-borne satellite's potential as a reconnaissance platform. Upon moving to the Air Staff, he had become the Air Force's principal liaison officer with RAND Corporation on long-range reconnaissance requirements.[19] Given his affiliation with the think tank, coupled as well perhaps with the timely appearance only a month before of General White's argument to establish an operational requirement for a reconnaissance satellite, Leghorn was no doubt now persuaded to include satellites within the framework of systems that could answer the Air Force's future reconnaissance requirements.[20]

However, while Colonel Leghorn's memo had an immediate influence on *airborne* strategic reconnaissance development, General White's request to establish an operational requirement for a space-borne reconnaissance satellite lay dormant for a full

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[17] Leghorn memo, as cited in Davies, 34. Note that Leghorn uses "disarmament" in the military sense and not in the political sense commonly recognized today. He means physical "disarmament" through strategic attack of the enemy's cability to wage war.

[18] Curtis Peebles, *Dark Eagles: A History of Top Secret U.S. Aircraft Programs* (Novato, CA: Presidio Press, 1995), 19. Camera-equipped bombers represented the mainstay of AF reconnaissance prior to these developments. While sufficient for periphery operations, penetration of the Soviet interior was both extremely risky and, for much of the country, impossible due to basing and fuel constraints.

[19] Peebles, 35.

year. It wasn't until December 1953 that ARDC at last established project 409-40, which pulled together the proliferating aspects of the Air Force's satellite studies and began the process of turning them into a physical developmental "system."[21] By November 1954, the Air Staff had articulated the formal system requirements for the satellite, now designated WS-117L (WS meaning "weapon system").[22] With these requirements in hand, ARDC finally responded with a formal development plan.

On 16 March, over two years after White had presented his case for the need, ARDC's Bombardment Missiles Branch at Wright Air Development Center (WADC) published the "General Operational Requirement for the Advanced Reconnaissance Satellite." The plan defined the objective of the satellite system as providing a means for continuous surveillance of "preselected areas of the earth" in order "to determine the status of a potential enemy's warmaking capability." The envisioned satellite would provide daylight visual coverage of airfields and missile launching sites in addition to offering an alternative capability to collect electronic intelligence and provide weather forecasting data. Initial projections expected WS-117L to be operational in 1965.[23]

The influence of Colonel Leghorn's ideas on air power strategy and the systems the Air Force pursued to implement that strategy was relatively profound. Finishing active duty in February 1953, clearly he had made a difference. But Leghorn's role in this story is not yet complete. He would retire from the Air Force and move into public service

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[20] Peebles, 35.

[21] Curtis Peebles, *High Frontier: The U.S. Air Force and the Military Space Program* (Washington D.C.: Air Force History and Museums Program, 1997), 5, 6; and Robert L. Perry, *Origins of the USAF Space Program, 1945-1956,* V, History of DCAS 1961. Air Force Systems Command (AFSC) Historical Publications Series 62-24-10 (Los Angeles: AFSC, Space Systems Division, 1961), 35, 36.

[22] Perry, 41; and Spires, 36, 37.

[23] Perry, 42, 43.

within the Eisenhower administration. There his influence would have even broader implications in the coming years.

BOMI. The third aerospace-enabling program, distinct from the ballistic missile or the satellite, appeared officially within ARDC on 1 April 1954. Two years previously, Bell Labs approached the Air Force with a proposal for a rocket-powered piloted "aircraft" that would climb into space, accelerate from there to hypersonic velocities, and then glide its way around the globe to its target. ARDC had initially shown lukewarm interest in the proposal, but after repeated approaches by Bell, coupled with the subsequent developing interest in ICBMs, ARDC warmed to the idea that Bell's concept merited further study. The company was awarded a one-year contract to study the feasibility of the manned bomber-missile, or "BOMI."

As a boost-glide craft capable of both bombardment and reconnaissance missions, BOMI's concept called for a three-stage rocket propulsion system: two stages used to launch and accelerate the craft and one stage to return it home. The project would also serve as a test bed to explore the hypersonic speed regime. More importantly however, it was seen as an introductory investigation into reusable *manned* space vehicles.[24] Launching under rocket power and recovering as a glider, BOMI also marked the Air Force's first serious study of a system that would operate throughout the expanse of the aerospace environment. Bell's feasibility study generated enough interest that the following summer, ARDC extended its contract and, to broaden the technology base, invited ten other companies to submit similar proposals.[25]

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[24] Roy Franklin Houchin, II, "The Rise and Fall of Dyna-Soar: A History of Air Force Hypersonic R&D, 1944-1963" (Ph.D. diss., Auburn University, 1995), 72, 77, 86, 90.

[25] Houchin, 100.

Thus, as the summer of 1955 approached, although BOMI was still just a proposal, the Air Force's other aerospace concept's enabling technologies had moved out of their largely "on paper" status and into credible development programs within the Air Force. After two and a half years under the New Look, Atlas sat atop the Air Force's R&D priority list and the reconnaissance satellite program, first conceived by RAND nine years earlier, had finally become a reality. Furthermore, with the initiation of the BOMI program, the Air Force was beginning to explore the potential of a true aerospace vehicle. Interestingly, however, under ARDC's broad umbrella, although these three programs shared a critical technology as their common denominator, they remained geographically, organizationally, and doctrinally segregated from one another.

Atlas, WS-117L, and BOMI all depended functionally upon rocket technology, both for boost and guidance control. In fact, the only thing differentiating the missile from the satellite system was the rocket's nose cone cargo and its engine's burn time. However, Air Force planners either considered this fundamental relationship, first established by RAND in 1946, as relatively insignificant, or the connection simply remained obscure from their focus. The Atlas program was establishing its roots in California at WDD under General Schriever, with ICBM development as the sole reason for this division's existence. The WS-117L and BOMI programs were both located at this point in Dayton, Ohio at WADC—the Wright *Air* Development Center. Reconnaissance was heretofore an *air* function and BOMI was considered an "aircraft." Further separating the satellite from the ICBM was air power theory and doctrine, which saw strategic reconnaissance as a *supporting* role for strategic attack. Consequently, the Air Force held its WS-117L much lower developmental priority than the ICBM.

In terms of this study's institutionalization process model, by mid-1955, significant Air Force resources were being mobilized that would enable the aerospace concept to penetrate the organization beyond the layers of its top leadership. However, structural arrangements to facilitate that penetration and intellectual argument to justify it had yet to materialize in a way that would encourage this process further.

In the coming months, Air Force leadership would address these issues of organizational structure, which in turn would signal indirectly its position on their underlying doctrinal issues as well. But by the summer of 1955, as the technologies that would take the Air Force beyond the atmosphere were beginning to mature, the Eisenhower administration had reached a series of policy decisions crucial to this story. Collectively, these decisions would come to create a fundamental challenge to the aerospace concept.

BIRTH OF A NATIONAL SPACE POLICY

The period from the spring of 1954 through December 1955 is arguably one of the most remarkable (and in retrospect) successful periods in the history of 20th century American security policy formulation. Within this timeframe, formative elements of America's national space policy emerged that even today still remain in place. With regard to this study, Eisenhower's mid-50s policy developments had a paradoxical effect on the aerospace concept's institutionalization within the Air Force. On one hand, he established the ICBM as America's highest defense priority, which boosted rocket development within the Air Force onto the fast track. On the other, he pulled strategic reconnaissance out from under Air Force responsibility and put in motion the beginnings of his "space for peaceful purposes" policy, both of which would curb significantly the service's space-related aspirations. Although the focus on ICBMs would generate enormous momentum to support aerospace technologies, the latter two actions would challenge the aerospace concept's staying power within the Air Force for years to come.

Five inter-related developments describe the foundations of Eisenhower's burgeoning strategy for space. First, the Technology Capabilities Panel (TCP) brought the critical need for ballistic missiles and strategic reconnaissance to national level awareness. Second, from the TCP also came the U-2 program, which would serve as a stop-gap reconnaissance platform until the satellite could mature. Third, a growing interest from within the civilian scientific community to place a satellite in orbit during the upcoming International Geophysical Year (IGY)[26] gained national-level attention. The confluence of these three developments in turn generated America's first national policy document on space, NSC 5520, in the summer of 1955. Finally, Eisenhower's Open Skies proposal marked America's first credible peaceful gesture to the Soviets and signaled Eisenhower's intent to implement his broader Cold War strategy. Together, these developments would come to shape a two-track, mutually reinforcing policy for space. Space for peaceful purposes would seek to mitigate the Cold War arms race and ease its tensions. Concomitantly, Eisenhower would establish a national strategic reconnaissance regime that would provide him the confidence that space for peaceful purposes was sustainable. Ironically, the Air Force played a role, if sometimes indirect, in shaping each of these developments.

The Technology Capabilities Panel (TCP). The TCP first convened in July 1954. Its genesis occurred after Trevor Gardner, alarmed by the security concerns raised in his

[26] Scheduled between 1 July 1957 and 31 December 1958.

Teapot Report, persuaded the Office of Defense Management's Science Committee (ODMSC) to examine more closely the threat of a Soviet surprise attack. Motivated by Teapot's conclusions, key members of ODMSC secured a meeting with President Eisenhower in March 1954 and again in July, finally convincing him that a major study was warranted.[27] On 26 July, Eisenhower wrote a personal letter to Massachusetts Institute of Technology President James R. Killian, Jr. asking him to direct the assessment of America's security architecture.

Killian assembled the TCP with 50 of the nation's leading military, industrial, and scientific minds. They divided into three project teams: Strike Forces; Continental Defense; and Intelligence, the last chaired by Edwin H. Land of the Polaroid Corporation.[28] The panel reported officially to the president six months later on Valentine's Day 1955. "By all published accounts, [their] report affected the course of national security affairs enormously."[29] Of particular importance to the development of the aerospace concept were the findings of the Strike Force and Intelligence Panels.

The Strike Force Panel echoed and furthered Teapot's concerns from the year prior. It recommended that highest national priority be given to the Air Force's ICBM program. Furthermore, the panel urged the development of an arsenal of both land- and sea-based Intermediate Range Ballistic Missiles (IRBM) as well.[30] In ten months time, a course of events would eventually persuade the president to act on this advice.

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[27] R. Cargill Hall, "Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program,* vol. I, *Organizing for Exploration,* ed. John M. Logsdon (Washington, D.C.: NASA History Office, 1995), 218, 219; and William E. Burrows, *Deep Black: Space Espionage and National Security* (New York: Random House, 1986), 69.

[28] Hall, ed. Logsdon, 219; and Burrows, *Deep Black*, 70.

[29] Hall, ed. Logsdon, 219.

[30] McDougall, 116.

More significant, both from a national security standpoint and especially where this study is concerned, were the recommendations of the TCP's Intelligence Panel. As Colonel Leghorn had argued to the Air Force two years prior, the Land Panel (as it was also known) saw a vital role for peacetime reconnaissance. However, removed from an air power centric perspective, they recognized a subtle but crucial difference in its utility. The panel reported:

> We must find ways to increase the number of hard facts upon which our intelligence estimates are based, to provide better strategic warning, to minimize surprise in the kind of attack, *and to reduce the danger of gross overestimation or gross underestimation of the threat*. To this end, we recommend adoption of a vigorous program for the extensive use, in many intelligence procedures, of the most advanced knowledge in science and technology.[31]

For the Air Force, peacetime reconnaissance was a means to an end. Information led to more effective war planning and execution. The Land Panel, however, saw strategic reconnaissance as an end in and of itself. Information was economic and political bargaining power. The nuance would capture the president's attention. It would also initiate the erection of a political divide between air and space.

In its official report, the Land Panel strongly urged the development of reconnaissance satellites. Furthermore, it recommended beginning an immediate program to develop a small scientific satellite in order to establish, for subsequent military systems, the principle of "freedom of space" in international law.[32] And finally, the panel was explicit in suggesting the potential advantage in promoting an air-space divide.

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[31] "Meeting the Threat of Surprise Attack," Report to the President by the Technological Capabilities Panel, 14 February 1955, as cited in Davies, 61. Emphasis mine.

[32] Hall, ed. Logsdon, 220.

> The present possibility of launching a small artificial satellite into orbit about the earth presents an early opportunity to establish a precedent for distinguishing between "national air" and "international space," a distinction which could be to our advantage at some future date when we might employ larger satellites for intelligence purposes.[33]

Interestingly, however, although it was clear to all participants that reconnaissance satellites were still years away from being operational, the report's conclusions were conspicuously silent regarding recommendations for the period in between.

The U-2 Program. In fact, Edwin Land himself had quietly taken a proactive role with regard to establishing an interim reconnaissance capability. During the six months of panel hearings and investigations, Land became aware of both the critical need for accurate intelligence and the existence of technology that could fill this need quickly.

During hearings in the fall of 1954, an Air Force team from ARDC briefed the Land Committee on the status of the service's high altitude reconnaissance aircraft program that Leghorn's memorandum had initiated a year and a half earlier. In early June, the Air Force had rejected proposals from Fairchild, Martin, and Lockheed, and had selected Bell Labs' X-16 design. A formal contract for 28 aircraft had been awarded and signed by September with Bell's assurance that the aircraft would be operational in eighteen months.[34] ARDC told the Land Panel that it had dismissed Lockheed's U-2 proposal because the single engine design Lockheed had in mind failed to meet combat specifications.[35]

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[33] As quoted in Robert R. Bowie, Policy Planning Staff, Department of State, "Memorandum for Mr. Phleger," March 28, 1955, in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program,* vol. II, *External Relationships,* ed. John M. Logsdon (Washington, D.C.: NASA History Office, 1996), 273.

[34] U.S. Central Intelligence Agency, Center for the Study of Intelligence, *The CIA and the U-2 Program, 1954-1974,* by Gregory W. Pedlow and Donald E. Welzenbach, (Washington, 1998), 13.

[35] Burrows, *Deep Black*, 72, 73.

The following day, Kelly Johnson, Lockheed's chief U-2 designer, appeared before the Land Panel to argue that if the Air Force could provide the requisite engines, he could have a prototype airframe built within just eight months after the go-ahead. For Land, time was more critical than Air Force requirement standards. He was able to convince the TCP chairman of the same, and subsequently, both he and Killian quietly began canvassing the highest levels of government to build support *outside* the Air Force for Johnson's U-2.

On 5 November 1954, Land wrote Central Intelligence Agency (CIA) Director Allen Dulles a memo titled "A Unique Opportunity for Comprehensive Intelligence." Of the U-2, Land argued:

> No proposal or program that we have seen in intelligence planning can so quickly bring so much vital information at so little risk and at so little cost…. We have been forced to imagine what [the Soviet's] program is, and it could well be argued that peace is always in danger when one great power is essentially ignorant of the major economic, military, and political activities…of another great power. …We cannot fulfill our responsibility for maintaining peace if we are left in ignorance of Russian activities.[36]

Land's argument remained persuasive. Thereafter, Dulles resolved to bring aerial reconnaissance to the CIA.[37]

Meanwhile, Killian and Land had together been meeting privately with President Eisenhower. They convinced him of the U-2's capability to fill the nation's need for Soviet intelligence.[38] The president was also receptive to their belief that strategic aerial reconnaissance should be a CIA mission. Killian recalled many years later that

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[36] Edwin H. Land, Memorandum for: Director of Central Intelligence, Subject: A Unique Opportunity for Comprehensive Intelligence (Central Intelligence Agency, Washington, D.C.: November 5, 1954), as cited in Peebles, *Dark Eagles*, 22.

[37] Burrows, *Deep Black*, 73.

[38] Burrows, *Deep Black*, 71.

Eisenhower had been feeling the effects of the Air Force's use of reconnaissance to pry more funding out of Congress and therefore had strong reservations about the Air Force playing a primary role in the collection of intelligence. He had no interest in allowing the service to "compose its shopping list for weapons based on a threat assessment that came from intelligence it alone collected, processed, and interpreted."[39]

On 24 November, Eisenhower gathered Allen Dulles, Secretary of State John Foster Dulles, Defense Secretary Charles Wilson, Air Force Secretary Harold Talbott, and Air Force Chief of Staff Nathan Twining in the oval office to craft the rudimentary organizational architecture for the first national strategic reconnaissance program.[40] Codenamed "Aquatone," the U-2 program would be controlled by the CIA, supported with pilots, maintenance, and parts from the Air Force, and enshrouded in the deepest secrecy. Hence, no mention of it ever appeared in the TCP's final report, classified or otherwise.

CIA Director Dulles selected Richard M. Bissell, Jr. to head "Aquatone" and the Air Force assigned Colonel Osmond J. Ritland as the service's coordinator.[41] The combination proved effective—Ritland became the program's deputy the following summer, and these two individuals would later team to manage America's first reconnaissance satellite program as well.

On 9 December 1954, a contract was signed with Lockheed for 20 planes at a total cost of $22 million.[42] Most eyes within the Air Force merely saw the X-16 program

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[39] Burrows, *Deep Black*, 73.

[40] Peebles, *Dark Eagles*, 23.

[41] Peebles, 25. See also Pedlow and Weltzenbach for a much more extensive account.

[42] Peebles, 23.

suddenly die. Not so well recognized was that the Air Force had been flanked, and that the CIA now controlled strategic aerial reconnaissance.[43]

All told, the TCP's influence on the institutionalization of the aerospace concept within the Air Force would be extraordinarily discouraging. True, the panel had thrown its full weight behind the ICBM, which in short time would translate into aggressive national support for the Atlas program. But they had also convinced Eisenhower that ballistic missiles were not the sole answer to his Cold War dilemma. Equally as important, if not more so in the long run, was the need for accurate intelligence in the effort to stem the arms race.

Eisenhower, on Land's recommendation, came to embrace *an inversion of the Air Force's perspective on strategic reconnaissance.* The Air Force held that strategic reconnaissance was a support function under the service's primary mission of strategic attack. The former certainly made the latter more effective, but it was ultimately less important a capability in the Air Force's eye. The president, however, came to see this relationship reversed. Indeed, accurate strategic reconnaissance could potentially prevent the need to attack anything. Moreover, because the Land Panel had highlighted as well the extraordinary potential of satellites in this regard, it is likely that late-1954 marked the first time that Eisenhower had begun to recognize that space might be leveraged to break the Cold War impasse between America and the Soviet Union. An examination of the events that would unfold in the coming year supports this point. For starters, concurrent developments underway publicly within the international scientific community were also helping to clarify Eisenhower's vision.

[43] Burrows, *Deep Black*, 73, 74.

The International Geophysical Year. As mentioned previously, one month prior to Eisenhower's election, American scientists had proposed the idea of launching a satellite in the name of cooperative international science during the coming IGY. The proposal was accepted by the International Council of Scientific Unions (ICSU) at their 1952 convention in Rome, and since then, various public lobbying efforts had been underway around the world to build support for the project. By August 1954, the American Congress voted to sanction U.S. participation in the IGY and shortly thereafter, its IGY special committee recommended that thought be given to actively participating in the IGY satellite effort. The House of Representatives subsequently began considering the release of public funds to support American scientists in that effort.[44] Two months later, the ICSU's committee for IGY recommended to the world's governments that nations try to launch earth satellites during the geophysical year in the interest of global science.[45] The convergence of the TCP Report's intelligence recommendations and a growing public interest in an IGY satellite generated a requirement within the Administration to begin examining and developing a policy for outer space.

NSC 5520. On 20 May 1955, Eisenhower's National Security Council signed NSC 5520, "Draft Statement of Policy on U.S. Scientific Satellite Program." It was a highly classified document that represented America's first official policy statement related to space. Excerpts significant to this study are below:

> The U. S. is believed to have the technical capability to establish successfully a small scientific satellite of the earth in the fairly near future….

[44] Perry, 47.

[45] McDougall, 118.

> The report of the Technological Capabilities Panel…recommended [phrase excised during classification review] an immediate program leading to a very small satellite in orbit around the earth, and that re-examination should be made of the principles or practices of international law with regard to "Freedom of Space" from the standpoint of recent advances in weapon technology.…
>
> *Considerable prestige and psychological benefits will accrue to the nation which is successful in launching the first satellite.* The inference of such a demonstration of advanced technology and its unmistakable relationship to inter-continental ballistic missile technology might have important repercussions on the political determination of free world countries to resist Communist threats, especially if the USSR were to be the first to establish a satellite. *Furthermore, a small scientific satellite will provide a test of the principle of the "Freedom of Space."* …It should be emphasized that a satellite would constitute no active military offensive to any country over which it might pass. …*The U.S. should emphasize the peaceful purposes of the launching of such a satellite*, although care must be taken as the project advances not to prejudice U. S. freedom of action to proceed outside the IGY…[46]

America's first space-related policy thus secretly set forth two goals of high national importance—establishing the legality of the principle of "Freedom of Space" and becoming the first nation to get there.[47] But it also represented the beginning attempts by Eisenhower to protect space from becoming the next area of escalation in the Cold War arms race. "Space for peaceful purposes" was not yet firmly established as a national policy but NSC 5520 laid the foundation from which this broader policy would evolve.

Interestingly, in the current declassified version of NSC 5520, very little is mentioned with regard to the Air Force's reconnaissance satellite program. It is clear however, that the Administration was considering this program as of May 1955. NSC 5520 noted in its "Courses of Action" section that while the Defense Department would initiate the IGY program, "this program would not prejudice continued research [phrase

[46] U.S. National Security Council, NSC 5520, "Draft Statement of Policy on U.S. Scientific Satellite Program," May 20, 1955, in ed. Logsdon, 308-309. Emphasis mine.

[47] McDougall, 119-120.

excised during classification review] or materially delay other major Defense programs."[48] However, while small portions of this document remain excluded still from the public domain, which no doubt refer to the Air Force's satellite plans, one must remember that the Air Force had released its first "General Operational Requirement for the Advanced Reconnaissance Satellite" *only two months prior* to NSC 5520's appearance. Furthermore, the ARDC proposal estimated the system would not be operational for another *ten years*.

These observations indicate that WS-117L was in all likelihood not yet a national developmental priority in Eisenhower's mind. Decidedly, strategic reconnaissance was critical to him—the existence and nature of the U-2 program provides clear evidence of that—but the Air Force's satellite proposal would not be folded into Eisenhower's reconnaissance apparatus for another three years yet. Meanwhile, as will be shown later in this chapter, *within the Air Force*, the satellite would continue to hold a back seat to its ICBM program.

If the Soviets could have seen NSC 5520, they no doubt would have interpreted it as "mere rhetoric" rather than an "honest act of peace." But only two months after he signed this document, Eisenhower would surprise even his own advisors with a proposal to the Soviet Union that would attempt to show "sincerity of peaceful purpose attested by deeds." He would propose to open the skies over the U.S. and the USSR in an attempt to shift the strategic reconnaissance needs of both nations out of the tension-laden realm of secret espionage.[49]

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[48] McDougall, 310.

[49] John Lewis Gaddis, *We Now Know: Rethinking Cold War History,* (Oxford: Clarendon Press, 1997), 245.

The Open Skies Proposal. Eisenhower presented his Open Skies proposal to the Soviets on 21 July 1955 at the historic Geneva Summit Conference. The idea, however, was originally part of a sophisticated negotiation strategy prepared specifically for the historic meeting.

Five weeks prior to the Geneva Summit, Nelson Rockefeller, at the time a special assistant to the president, had gathered a group of advisors to craft a bargaining strategy for the upcoming conference. The Quantico Panel, as this group was called, developed a plan that took form as a series of incrementally more tension-easing proposals which, if accepted by the Soviets, would provide American policy makers with a gauge to measure more precisely Soviet intentions. Collectively, these proposals represented "a spectrum of degree of difficulty for the Soviet Union to accept," each one offering a more pacific position. In other words, if the Soviets were willing to cooperate only at the lower range, then this would signal a weaker inclination toward peace and in turn prescribe in the summit's wake that America adopt a more energetic military and foreign policy. The Quantico strategy was a provocative one. However, Eisenhower didn't buy it completely—just its last step.[50]

The following month at Geneva, in front of the heads of state from Great Britain, France, and the Soviet Union, Eisenhower departed unexpectedly from a statement prepared the night before by his special assistant on disarmament, Harold E. Stasson.[51] Semi-impromptu, the American president surprised the world with the following proposal (in his words):

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[50] Walt Whitman Rostow, *Open Skies: Eisenhower's Proposal of July 21, 1955* (Austin: University of Texas Press, 1982), 11-13.

[51] Rostow, 6.

> Gentlemen, since I have been working on this little paper to present to this Conference, I have been searching my heart and mind for something that I could say here that could convince everyone of the great sincerity of the United States in approaching this problem of disarmament. I should address myself principally to the delegates from the Soviet Union, because our two great countries admittedly possess new and terrible weapons in quantities which do give rise in other parts of the world, or reciprocally, to the fears and dangers of surprise attack.
>
> I propose, therefore, that we take a practical step, that we begin an arrangement, very quickly, as between ourselves—immediately. These steps would include:
>
> To give to each other a complete blueprint of our military establishments, from beginning to end, from one end of our countries to the other; lay out the establishments and provide the blueprints to each other.
>
> Next, to provide within our countries facilities for aerial photography to the other country—we provide you the facilities within our country, ample facilities for aerial reconnaissance, where you can make all the pictures you choose and take them to your own country to study; you provide exactly the same facilities for us and we to make these examinations, and by this step to convince the world that we are providing as between ourselves against the possibility of great surprise attack, thus lessening danger and relaxing tensions. …
>
> The quest for peace is the statesman's most exacting duty. Security of the nation entrusted to his care is his greatest responsibility. Practical progress to lasting peace is his fondest hope. Yet in pursuit of his hope he must not betray the trust placed in him as guardian of the people's security. A sound peace—with security, justice, well-being, and freedom for the people of the world—can be achieved, but only by patiently and thoughtfully following a hard and sure and tested road.[52]

Khrushchev rejected this remarkable offer as "nothing more than a bald espionage plot…. [His] purpose was evident—at all costs to keep the U.S.S.R. a closed society. He would permit no effective penetration of Soviet national territory or discovery of its military secrets, no matter what reciprocal opportunities were offered to him."[53] His

[52] U.S. Department of State, Telegram from the Delegation at the Geneva Conference to the Department of State, 21 July 1955, *Foreign Relations of the United* States [hereafter FRUS], *1955-1957,* vol. 5, *Austrian State Treaty; Summit and Foreign Ministers Meetings, 1955* (Washington, D.C.: Government Printing Office, 1988), 452-3.

[53] Rostow, 8-9. As quoted in Eisenhower's memoirs.

"dismissal of 'Open Skies,'" observed historian Walter McDougall, "and the Superpowers' unwillingness to talk disarmament on each other's terms forced Eisenhower to prepare for the imminent missile age."[54] This study proposes a more direct influence of this non-event. Had an open skies agreement come to exist between the Cold War adversaries, Eisenhower's emerging space policy—and the consequent geopolitical necessity to cordon off "space" as a different place from the atmosphere—would have become irrelevant. Open Skies, however, was not to be. Eisenhower returned home and began to implement his strategy for space.

It is no coincidence that on 28 July 1955, five days after returning from Geneva, and according to the plan laid out in NSC 5520 to proceed with maximum publicity of the scientific, international, and peaceful character of the program, White House Press Secretary James Hagerty declared America's intent to launch a satellite for the IGY.

> On behalf of the President, I am now announcing that the President has approved plans by this country for going ahead with the launching of small earth-circling satellites as part of the United States participation in the International Geophysical Year which takes place between July 1957 and December 1958. This program will for the first time in history enable scientists throughout the world to make sustained observations in the regions beyond the earth's atmosphere.
>
> The President expressed personal gratification that the American program will provide scientists of all nations this important and unique opportunity for the advancement of science.[55]

Two days later, the Soviet Union followed with an announcement of a similar intent. The Cold War, however, continued undeterred.

In November 1955, Russia successfully detonated an air-delivered hydrogen bomb, surpassing America's nuclear weapons development program by demonstrating their

[54] McDougall, 128. The Open Skies Proposal was eventually signed between the two superpowers on 24 March 1992 under President George Bush.

possession of credible ICBM warhead technology. Eisenhower responded on 1 December with a signature. With his approval of NSC 1484, the president implemented officially the TCP's recommendation of eleven months prior to assign the highest national priority to both the Atlas ICBM and the IRBM.[56]

The decision marked the close of a fascinating period in American security policy development. Between the TCP, "Aquatone," IGY, NSC 5520, and Open Skies, Eisenhower had crafted a delicate balance of directives, proposals, and initiatives through which he would steer his overarching Cold War strategy throughout the remainder of his Presidency. Indeed, the framework would evolve and continue to guide the presidents that followed. For an emergent aerospace concept, however, this period foresaw stormy weather. At the beginning of the Eisenhower administration, the notion that the realm of air and space represented the Air Force's operational continuum seemed a valid, albeit distant one. The systems to enable the idea were yet to be fielded, but the promise of their arrival was certainly apparent. By the end of 1955, however, Eisenhower was laying the foundations of a space policy that would demand space be a different place and hence directly challenge the aerospace concept. Remarkably, there is significant irony surrounding all of these events as evidence indicates that the Air Force had a substantial if unintended influence in their unfolding.

With regard to the TCP and its subsequent encouragement of the U-2 program, Trevor Gardner's efforts were "instrumental in stimulating scientists advising the president to take an active role in identifying solutions to the problem of surprise

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[55] James C. Hagerty, Statement at the White House, 29 July 1955, in ed. Logsdon, 200-201.

[56] Neufeld, 146.

attack."[57] Besides prodding ODMSC to address the defense problem which subsequently evolved into the TCP, it was Gardner's personal "encouragement and close support" that brought Kelly Johnson to the Air Force with his U-2 proposal. Moreover, following the Air Force's rejection of it in June 1954, together "Johnson and Gardner [began lobbying] Edwin Land's technical intelligence group as soon as it was formed."[58] Thus, Trevor Gardner, an Air Force advocate, was instrumental in the events that led to the shift of strategic aerial reconnaissance from the Air Force to the CIA.

If Gardner's influence here is somewhat tenuous, the Air Force's role in NSC 5520 and Open Skies is profound. Walter McDougall, in *…the Heavens and the Earth* wrote that Paul Kecskemeti's October 1950 RAND report "more than any other, deserves to be considered the birth certificate of American space policy."[59] The earlier summary of this document, presented in Chapter 3 (see pages 85-7), highlights the remarkable parallels between it and Eisenhower's mid-1950s space policy, not only in its basic strategy, but even in the specific language used in NSC 5520 to record it.[60] McDougall's history, however, left unresolved the connection between Kecskemeti's report and national space policy five years hence. This study argues that the most likely bridge between the two was Colonel Richard S. Leghorn.

While serving on active duty, Leghorn's work in future reconnaissance requirements and his additional position as the Air Force's chief reconnaissance liaison with RAND undoubtedly made him intimately familiar with RAND's satellite studies. Interestingly,

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[57] Davies, 56.

[58] Burrows, *Deep Black*, 72, 73.

[59] McDougall, 108.

[60] The italicized portions of the document as quoted on p. 117-8 represent in all likelihood ideas taken directly from Kecskemeti's study.

after Leghorn left the Air Force for a second time in January 1953, he became an advisor to Harold E. Stasson.[61] Stasson in turn was a speechwriter for Eisenhower during his 1952 election campaign and afterward became the president's special assistant on disarmament.[62] Part of a small group of powerful voices in the articulation of policy to whom "Eisenhower entrusted a full and complete account of American foreign policy goals and methods," Leghorn's boss was present in Geneva when Eisenhower offered his Open Skies proposal.[63] Thereafter, Colonel Leghorn assisted U-2 program director Richard Bissel "in efforts to anticipate and offset political resistance to aerial and satellite reconnaissance during the U-2 and satellite development activities in the late 50's."[64] In other words, the man largely responsible for developing the Air Force's position on strategic reconnaissance is likely the man who brought the Kecskemeti paper to the lap of national leadership.

Kecskemeti's report was written for, presented to, and apparently "sat" unobtrusively within the Air Force for over four years. During this time, RAND had lobbied hard within the service for support of its reconnaissance satellite. RAND's argument was based largely based on the satellite's *political* value, and as such, it failed to generate interest within a service focused on strategic attack. What was disregarded at the time as either unimportant or simply unrecognized ironically became a cornerstone of the nation's Cold War security strategy five years hence. An interesting side note that supports further still the profound influence of this report is that on 8 November 1955,

[61] Davies, 42.

[62] Medhurst, 38; and Rostow, 3.

[63] Medhurst, 74. *The Corona Story*, an NRO history, asserts that "the open skies concept…originated with Leghorn." (p.6) While this information could not be confirmed elsewhere, Leghorn's experience and thoughts on "peacetime reconnaissance" makes the assertion plausible.

Kecskemeti's paper was quietly "withdrawn" from the listing of RAND's publications—a full five years after the report initially appeared. Moreover, it remains conspicuously absent from that list still today.

Two and a half years into Eisenhower's first term and a decade now into this study's reach, a conceptual tension is emerging that will permeate ever more forcefully throughout its remainder. At this point, each of the poles that create it is developing in relative seclusion from one another. The Air Force, under a security strategy resting largely upon air power, is receiving unabashed support to pursue the systems—conceived during the decade prior—that will enable it to extend its operational realm beyond the atmosphere. Moreover, there is nothing yet deterring airmen from their implicit assumption that space extends naturally and continuously from the atmosphere. At the same time, however, behind closed doors and only among an intimate few at this point, Eisenhower is crafting a strategy for space which implies an alternative paradigm that in time will come to confound the Air Force's sights.

In October 1957, when mankind's first artificial satellite gets launched from the other side of the world, this brewing tension will find itself tossed prematurely and unexpectedly into the public domain. Meanwhile, its antagonists will continue to develop in relative isolation from each other. Furthermore, the rancorous atmosphere between the services, vying over missions and resources, will continue to rear its head.

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[64] Davies, 42.

CONVERGING CURRENTS (1955-57)

Eisenhower's New Look, which emphasized strategic striking power and superior technology in exchange for decreased conventional capability, had not sat as well with the Army and Navy as it had with the Air Force. While the Navy had found some respite in its quest for a relevant mission during the Korean War—arguably the foundational experience for its present-day "from the sea" doctrine—the Army, "without a strategic nuclear mission, struggled with large cutbacks and the loss of institutional clout."[65] The national level policy developments discussed in the previous section, however, offered both services the opportunity to reengage the Air Force for some control not only of the strategic attack mission, but of satellites as well. The spark that ignited this new round of interservice battles was the TCP Report's recommendation to develop the IRBM.

Keep in mind however, that by February 1955, when the report was released, the Air Force had already mobilized substantial resources and established a formidable amount of organizational infrastructure to support its burgeoning aerospace-enabling programs. Consequently, the interservice challenges described here, both in missiles and in satellites, did little to threaten directly the concept's institutionalization within the Air Force. Rather, their influence was indirect. The Killian Panel's report stimulated an already bitter climate among the services that Eisenhower's New Look policy had created. This in turn influenced the perceptions of politicians and officials outside of DoD, who, in three years time, would be making crucial policy decisions concerning the character of America's space program. As well, the programs the Army and Navy initiated during this period carry through into the coming decade, sometimes under different organizations, but always with continuing influence on Air Force decision-making. These events, therefore, merit closer examination.

INTERSERVICE DEVELOPMENTS

The Army's missile program survived the early 1950s by exploiting ambiguities in the Key West Agreement. The Redstone rocket was its response to the Defense Department's clarification in November 1949 defining the Army's prerogative in guided missiles as short-range surface-to-surface systems which "supplement, extend the capabilities of, or replace the fire of artillery." This generated a third amendment to Key West that appeared in 1951 to define the Army's "combat zone" as "*normally* not to exceed 50 to 100 miles in depth."[66] But for a service feeling rather marginalized under Eisenhower's security strategy, these were hardly normal times.

Through 1953, "Von Braun & Company" maintained their lead in the American military's "missile race" with a focused, incremental approach. On 20 August 1953, the first of 36 Redstone launches over the next five years lifted off from the shores of Cape Canaveral, Florida.[67] And as work at the Redstone Arsenal continued, the rocket's range soon approached the 500-mile capability… which induced yet another amendment—the fourth—to the Key West Agreement.

Still in search of an unambiguous way to express service responsibilities, on 13 November 1954, the Defense Department reiterated that the Army's role was a "tactical" one. Where guided missiles were concerned, the Army's responsibility was to develop

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[65] Peter L. Hays, "Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War" (Ph.D. diss., The Fletcher School of Law and Diplomacy, 1994), 86.

[66] "Chronology of Changes in Key West Agreements, April 1948 - January 1958," (prepared by the Historical Section, Joint Chiefs of Staff on 7 February 1958), 14. Emphasis mine.

[67] Roger D. Launius, "Prelude to the Space Age," in ed. Logsdon, 15.

surface-to-surface missiles "designed for employment against tactical targets within the zone of Army combat operations" (again, defined three years earlier as "normally not to exceed 50 to 100 miles in depth"). The new amendment continued, "Very long-range surface-to-surface missiles, of the *intercontinental* type shall be developed, procured, and employed by the U.S. Air Force."[68] Significantly, while this marked the first time that the DoD recognized an explicit Air Force responsibility for the ICBM, it left open to interpretation still the definition of "tactical." Indeed, this new amendment suggested now a third, as yet undefined gray area existing between "tactical" and "intercontinental." Three months later, however, the TCP Report stepped in to help clarify the new ambiguity.

On 14 February 1955, Killian's Strike Force Panel defined this area as an "intermediate zone," into which the services and their respective missile programs thereafter poured. As part of its coherent plan for stimulating missile development, the TCP Report recommended active pursuit of intermediate range ballistic missiles for both land and shipboard launch.[69] Implied in their text was the intent to capitalize on the positive benefits of interservice competition. In many respects, it worked.

The Army responded immediately with a new missile design. Von Braun, now Chief of the Army's Guided Missile Development Division, proposed plans for a new liquid-fueled Jupiter rocket. With over twice the thrust of Redstone, it would have a 1,500-mile range capability.[70] The Army prepared for the coming interservice battle for funding

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[68] "Chronology of Changes in Key West Agreements," 20. Emphasis mine.

[69] McDougall, 128, 116.

[70] Maj Gen John B. Medaris, U.S. Army, Ret., with Arthur Gordon, *Countdown for Decision* (New York: G.P. Putnam's Sons, 1960), 85.

with the choice to maintain its long-held "position that a 1,500-mile missile was simply an extension of the range of modern artillery."[71]

Acknowledging the intent of Killian's panel to encourage parallel development, yet seeking to maintain some semblance of control over the growing disorder within the Pentagon, Secretary of Defense Charles E. Wilson, on 8 November 1955, released a fifth Key West amendment.

> The Secretary of Defense assigned to the Air Force "management responsibility for the conduct of a land-based IRBM (IRBM#1) development program." At the same time he "assigned jointly to the Army and Navy an IRBM (IRBM#2) program having a dual objective of achieving an early shipboard capability and also providing a land-based alternate to the Air Force program.[72]

This time the Secretary's implied signal of service priority herein was clearly communicated. Major General Medaris, then the Army's Chief of Ordnance at Huntsville wrote, "Somewhat to our chagrin, …[t]his was a clear indication that insofar as the land-based IRBM was concerned, the Army Jupiter was considered as a 'back-up' to the Air Force [system]."[73] Unfortunately, Madaris' read of the Secretary's policy stopped short of foresight. He failed to discern the gloomy horizon facing the Army's missile program. For when the Navy entered the IRBM arena, the Army would quickly find itself as the odd man out in the Defense Department's ballistic missile game—intermediate range or otherwise.

As intended, the TCP Report reinvigorated ballistic missile interest within the Navy as well. Other than NRL's scientific research work with the Viking program, until 1955, the Navy had steered clear of the environment. There are two explanations for this.

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[71] Medaris, 85.

[72] "Chronology of Changes," 22.

First, liquid rockets—as yet, the only large rocket engines available—held little promise for shipboard use. Unwieldy, volatile, and difficult to maintain during operations at sea, liquid-fueled rockets, from a naval perspective, proved logistically elusive. Another issue, heard from within the Pentagon, was that Navy involvement in ballistic missiles would cast the Navy into a disadvantageous competition with the other two services, both of which already had developing programs well underway.[74] However, given the emerging promise of lighter thermonuclear warheads and inertial guidance systems—the latter arising from the Air Force's Atlas program—the Navy had begun to rethink its position. The TCP report provided the final impetus that brought the seaborne service to alter its course.

On 17 October 1955 the Chief of Naval Operations (CNO), Admiral Arleigh Burke, established the Special Projects Office. Its sole purpose was to develop a submarine-launched nuclear capable IRBM, however, the potential implications of this program were clear in Burke's mind. The office would report directly to the CNO and the Secretary of the Navy. Even more telling was Burke's selection of a naval *aviator*, Rear Admiral William F. Raborn, to direct it. Of this decision Burke said, "I wanted a man who could get along with aviators because this [program] was going to kick hell out of aviators. They were going to oppose it to beat the devil, because it would take away, if it were completely successful in the long run, their strategic delivery capability."[75] Given that the Navy's mid-50s aerial strategic attack capability was hardly the service's

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[73] Medaris, 74.

[74] Norman Polmar and Thomas B. Allen, *Rickover* (New York: Simon and Schuster, 1982), 536, 537.

[75] Polmar, 539.

mainstay, Burke's reference to "aviators" could only have inferred one thing: *Air Force* aviators.

The Army intended initially to leave IRBM development to von Braun's Guided Missile Development Division. However, with President Eisenhower's NSC 1484 announcement in December 1955 that placed ICBMs and IRBMs highest on the nation's developmental priority list, it became apparent that the organization responsible for the Army's missile program required the clout of a general officer. On 1 February 1956, the Army Chief of Staff authorized the creation of Army Ballistic Missile Agency (ABMA), and moved General Medaris from his position as Chief of Ordnance into his new role as ABMA's first commander. Medaris' immediate task was clear: to develop Jupiter and move Redstone out of R&D and into production and deployment. To help him accomplish this, the Army granted Medaris full authority to "call on any part of the Army" for support.[76] But ABMA's new commander could as well expect outside help, for Secretary Wilson's guidance had been clear: the Army would develop their IRBM *together* with the Navy.

While the Navy's Special Projects Office agreed to work "jointly" with ABMA on their Jupiter program, from the beginning Admiral Raborn warned that the Navy would switch to *solid-fueled* engines just as soon as the technology allowed them to. Madaris, convinced that a practical solid rocket propellant was still long off, was unconcerned. His forecasting powers continued to fail him.

In the summer of 1956, the Atomic Energy Commission projected that by the early 60s, nuclear warheads would weigh less than one-third their current weights. If so,

[76] Medaris, 74, 72.

calculated Raborn, then solid propulsion would finally exist as an alternative fuel.[77] Raborn convinced the CNO of this likely potential, who in turn convinced DoD. In July, the Navy won permission to back out of ABMA's Jupiter program. Three months later, Navy Special Projects Office proposed Polaris, the nation's first plan for a solid-fueled ballistic missile, and it joined Atlas shortly thereafter atop the national priority list.[78] Polaris would eventually rise to become the third and most survivable leg of America's strategic triad. "In a technological effort that in some ways was comparable to the Manhattan atomic-bomb program, Raborn [would] put the Polaris missile *system* to sea—in nuclear submarines—only three years after Sputnik."[79] In the end, Polaris would pose little challenge to the Air Force's aerospace concept. What Polaris did do, however, was threaten to kill the Army's ballistic missile program.

On 26 November 1956, one month following the release of the Polaris plan, Defense Secretary Wilson issued the sixth and final Key West Agreement Amendment regarding the organizational control of missiles, apparently putting to rest a contentious issue first raised over twelve years earlier in the 1944 McNarney memo.[80]

> Operational employment of the *land-based* Intermediate Range Ballistic Missile system will be the sole responsibility of the U.S. Air Force.
>
> Operational employment of the *ship-based* Intermediate Range Ballistic Missile system will be the sole responsibility of the U.S. Navy.
>
> The U.S. Army will not plan at this time for the operational employment of the Intermediate Range Ballistic Missile or for any other missiles with

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[77] Polmar, 541. Solid fuels, at this point, produced less energy pound for pound than liquid fuels. However, the AEC's projected decrease in warhead weight significantly reduced the missile's thrust requirements, thus enabling the Navy to switch.

[78] McDougall, 129.

[79] Polmar, 535.

[80] See chapter 3, p. 54.

> ranges beyond 200 miles. This does not, however, prohibit the Army from making limited feasibility studies in this area.[81]

For the Army, ballistic missiles, like artillery, were tactical weapons after all. But then again, missiles were only missiles when they carried a warhead. Without a warhead, missiles were rockets, and, as von Braun had held staunchly in sight since being brought to America in 1945, rockets could take the Army to space. Not only would Redstone and Jupiter survive given the amendment's innocuous final clause, ABMA's sights would expand further still. Not five months after "losing" their IRBM battle, Medaris and von Braun began "limited feasibility studies" for a big lifter, setting 1.5 million pounds of thrust as a target. Initially called Super Jupiter, this behemoth would in short time be known to the world as Saturn.[82]

During mid-1950s, ballistic missile programs were not the only ones generating interservice competition relevant to this study. Indeed, prior to the interservice IRBM battles, the Army and Navy became involved to some extent in satellites as well. While the Navy had left the satellite business alone after 1948 and the Army, despite von Braun's personal ambitions, had never indulged itself in this area, by 1954 burgeoning civilian interest in the IGY proposal stimulated both services to (re)examine the satellite's potential.

The first satellite proposal to appear outside of the Air Force came not surprisingly from von Braun. In late spring of 1954, he persuaded Army Ordnance to support him in offering a joint satellite venture to the other services. In his report, von Braun wrote, "a man-made satellite, no matter how humble, would be a scientific achievement of

[81] "Chronology of Changes," 26. Emphasis mine.

[82] William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998), 261.

tremendous impact." Acknowledging that other countries had similar technology available, and that they might soon be able to do the same, he warned, *"[i]t would be a blow to U.S. prestige if we did not do it first."*[83] Seeking to distribute the plan's anticipated $17 million cost, on 15 September von Braun formally offered the Air Force and the Navy participation in a project to launch a 5-pound inert slug into orbit.[84] Yet, by this time, the Air Force was already six months into its reconnaissance satellite study. Consequently, it rejected the offer forthright as one that had no military utility and would only distract them from their long-range interests. The Navy, however, showed more than mild interest.[85]

By early 1955, the Redstone Arsenal and the Office of Naval Research had worked out the details of their plan and dubbed their project "Orbiter."[86] The Army would supply the Redstone booster, the Navy the satellite and its tracking and data analysis.[87]

Also by this time, however, policy discussions concerning the IGY were emerging from within the administration. When NSC 5520 appeared in May with an expressed intent to emphasize the peaceful and scientific nature of the IGY effort, the Navy recognized that Project Orbiter's military character likely threatened its survival. Consequently, they initiated a backup "Scientific Satellite Program" which proposed using as a first stage booster the NRL's more civilianized Viking sounding rocket.[88]

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[83] McDougall, 119. Italics in original.

[84] Perry, 46.

[85] Perry, 46.

[86] Perry, 47.

[87] McDougall, 119.

[88] Perry, 48; and Hall, ed Logsdon, 221.

With the administration's public announcement on 28 July of America's intent to launch a scientific satellite during the IGY came the formation of a committee to select the system that would move forward. Chaired by Homer Stewart of the Jet Propulsion Laboratory, the committee considered three proposals. The first was von Braun's joint "Project Orbiter" venture with the Navy, the second was the Navy's less-militarized Viking proposal, now called "Project Vanguard," and the third was an Air Force plan known as "World Series," which would use an Atlas booster. As the Navy had accurately predicted, both "Orbiter" and "World Series" links with military missile development proved politically too close for comfort. Although "Orbiter" planned to use the Redstone rocket, which was clearly further along in development and consequently showed the most promise of meeting the IGY deadline, the Viking system's civilian flavor, established long before when NRL first began to develop its rocket in 1945, was the more important consideration. After a month of review, the Stewart Committee announced its IGY satellite system selection. Vanguard, a *Navy*-sponsored system, carried America's bid to be the first nation into space.[89]

In retrospect, the interservice challenges of the mid-50s failed to have as direct an effect on the Air Force's aerospace concept as they had the decade prior. By mid-1955, ARDC had two solid developmental programs rolling in Atlas and WS-117L, and BOMI was getting underway. Furthermore, under Eisenhower, there was little question that strategic attack was the airman's domain. ICBMs were the Air Force's alone, and from its perspective, the IRBM issue had in two respects been somewhat of a blessing. First, and rather ironically, the Navy's development of Polaris weakened beyond repair the

[89] Perry, 48, 49; and McDougall, 121.

Army's long-standing challenge in land-based ballistic missiles. ABMA would continue to present its Jupiter as a preferred IRBM system over Thor and this confrontation would heatedly erupt in short time. However, from the broader perspective of the Air Force's strategic attack mission, following the November 1954 Key West Amendment, ABMA never again posed a serious challenge to it.[90] The second blessing delivered by the interservice IRBM challenge was the Polaris-generated solid fuel technology developments that would spin off and energize the Air Force's future ICBM mainstay, Minuteman. As for the interservice challenge surrounding the IGY satellite, for the Air Force this proved no more than a skirmish. If von Braun wanted to launch five pounds of metal into orbit just to get there first, so be it. The same went for the Navy. The Air Force was more than content with looking toward a 1,500-pound satellite that had legitimate military utility.

The important influence, with respect to this study, of the interservice challenges in the IRBM and satellite is this: "[t]he competition created in the minds of many [outside] observers a negative perception of the ability of the Services to conduct programs associated with missiles and space. …The atmosphere created by this and other instances of interservice rivalry also had an impact on how the president and the Congress viewed space and defense issues in the late 1950s."[91] These factors would arise and contribute significantly to the national policy decisions reached in the months following Sputnik. Although the dust would settle eventually to find the Air Force with a favorable position

[90] For a detailed account of this story, see Michael A. Armacost's *The Politics of Innovation: The Thor-Jupiter Controversy* (New York: Columbia Press, 1969).

[91] Hays, 90.

in space *vis à vis* the other services, for the first time in this story, the reins of *direct* civilian control would descend over the military's development of space.

AEROSPACE DEVELOPMENTS

Returning now to developments internal to the Air Force, as of the summer of 1955, the service's aerospace-enabling programs were separated geographically and functionally. WS-117L (the reconnaissance satellite) and BOMI were both located in Ohio at the Wright Air Development Center. The Atlas program existed independently on the west coast under the command of General Schriever's Western Development Center. Issues associated with this functional split help explain the Air Force's tepid interest in the IGY satellite.

Because of ARDC's organizational structure in 1955, its divisions directly affected by the "World Series" proposal viewed participation in the IGY satellite plan as a distraction. Atlas was the Air Force's only available launcher big enough to power an Air Force-sponsored satellite and thus by default the project demanded cross-divisional coordination. From Schriever's perspective, this would divert resources from his primary and top priority task. Not surprisingly then, the WDD commander was the proposal's most vocal critic.

Schriever felt that accelerating Atlas development in order to launch a scientific satellite for the IGY would only prolong delivery of the ICBM. During late spring of 1955, Schriever and his staff "consistently emphasized that the earliest possible operational availability of an intercontinental ballistic missile was the key objective of the Air Force [missile] program and that an Atlas-launched satellite effort had to hinge on success in that effort."[92] Schriever counseled further against becoming involved with the IGY program because the military aspects of the Air Force's satellite project were more important in the long run.[93]

But pressure from the Air Staff prevailed. On 29 July 1955, the day after the White House announced the nation's intent to put a scientific satellite into orbit by 1958, ARDC under Air Staff direction entered its Atlas-powered "World Series" satellite bid into the IGY competition.[94] Thus, the Stewart Committee's selection of "Vanguard" was no doubt somewhat of a relief to the Air Force's missile builders in California. What WDD couldn't realize at the time was that the Stewart decision, in light of what transpired in the months that followed it, was arguably a windfall. It spared the expense of critical resources which WDD would soon, for other reasons, be taxing to the limit. The Air Force's missile development complex was about to undergo an enormous expansion.

Through the summer of 1955, as the "World Series" proposal was prepared at ARDC, WDD moved forward with its main objective. On 28 April 1955, ARDC had approved the division's initial plans for Titan—an ICBM follow-on to Atlas.[95] By the end of July, Schriever's team was stand testing its Atlas engine and awaiting ARDC approval of its plan for moving the system forward into the field.[96] The division was pushing to accelerate the program to operational status as quickly as possible, "restricted

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[92] Perry, 53.

[93] Neufeld, 144.

[94] Perry, 51; Peebles, *High Frontier*, 8; and Spires, 38.

[95] Houchin, 95.

[96] Launius, ed. Logsdon, 16.

only by technical considerations."[97] However, fall's approach brought two major developments for the Air Force's ICBM builders.

First, Schriever's boss, ARDC Commander Lieutenant General Thomas Power had begun to recognize finally that the satellite's development depended intimately upon its launch platform. Likely a result of the intra-organizational deliberations over the "World Series" proposal, Power began to examine marrying the WS-117L program with its projected carrier in California. Schriever objected for the same reasons he had opposed the "World Series" plan: tasks not germane to long-range strategic nuclear missiles would only interfere with and delay his main assignment.[98]

Again, the ARDC commander overruled. On 10 October 1955, General Power transferred the Air Force's satellite project from its Ohio home at WADC to WDD in California. When the move commenced in February 1956, it marked the first time in Air Force history that its organizational structure acknowledged the intimate technological relationship between satellites and missiles that RAND had identified explicitly almost ten years earlier. The satellite program would benefit greatly from its transfer out from under the Ohio research facility that was devoted largely to aeronautics.[99]

Second, with pressure mounting from the other services' recent push into the IRBM development fold, Schriever's engineers, anticipating an Air Force interest there as well, had found that a counter-proposal could easily be fashioned out of the Atlas program. Thor, as the system was named, would use the same nose cone, guidance system, and

[97] Neufeld, 130.

[98] Perry, 43.

[99] Spires, 38.

engine as Atlas. The only new piece to the smaller missile would be its air frame.[100] Thus, WDD had assured ARDC and the Air Staff that the Air Force was well positioned for Secretary Wilson's directive of 8 November 1955 assigning the Air Force management responsibility of the land-based "IRBM #1." Likewise, WDD was somewhat prepared for what followed.

On 14 December, responding immediately to Eisenhower's call placing ICBMs and IRBMs atop the nation's developmental priority list, Power directed WDD to assume responsibility for IRBM development as well.[101] Concurrently, he also approved Schriever's plan for operational deployment of Atlas, directing that ten systems be delivered to Strategic Air Command (SAC) on April 1959 with an ICBM force increase to 120 (80 Atlas and 40 Titan) by January 1960.[102] Suddenly, during the last quarter of 1955, WDD had "acquired responsibility for building a 'family of missiles,' including the Atlas and Titan ICBMs, the Thor IRBM, and [as well] the WS-117L reconnaissance satellite."[103] Since opening its doors in July 1954, it had taken just *eighteen months* for WDD, under General Schriever's command, to become a major weapons development center. Responsible now for building the Air Force's emerging missile and satellite force, it was becoming as well the organizational home of the aerospace concept. This point, however, shines a bit more significance upon what otherwise would have been a minor corollary incident that took place during the fall of 1955.

General Power's logic for marrying the satellite with its planned booster, from a systems, technological, and operational point of view was sound. In fact, Schriever too

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[100] Futrell, 495. Thor, unlike the three-stage Atlas, was envisioned as a single-stage missile.

[101] Neufeld, 147.

[102] Neufeld, 143.

quickly recognized this.[104] However, in November 1955, when BOMI's development team approached General Schriever at WDD seeking a similar relationship with the West Coast division, Schriever flatly rejected the idea. Although the BOMI team's argument was consistent with the one driving Power's decision reached the month prior—the hypersonic glide system also depended fundamentally on rocket technology—the Air Force's only true "aerospace" program would remain at WADC under the *aeronautics* division. Worse, Schriever subsequently prohibited BOMI's Bell Labs contractors from even contacting their counterparts in California.[105]

General Schriever's decision was of little consequence at the time. BOMI was still just a fledgling program. And certainly, like his initial opposition to integrating WS-117L with the Atlas program, Schriever's rejection of BOMI's request to join hands was entirely supportable given the environment he faced. At the time, WDD was focused on America's vitally needed nuclear-capable strategic attack missiles. But the decision marked the beginning of WDD's lack of interest in cooperating with the Air Force's attempts to field a hypersonic boost-glide vehicle.[106] Through the lens of this study, one can see retrospectively how the combined organizational structure decisions of Generals Power and Schriever in the late fall of 1955 in fact mark the subtle beginnings of what would later evolve into a separate space sub-culture within the Air Force. The theme,

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[103] Neufeld, 143, 147.

[104] As evidence, during the coming year Schriever would throw his energy behind instituting what became known as his "concurrency approach," whereby both cost and risk was sacrificed to implement parallel (or simultaneous) development of two systems. It was revolutionary for the R&D community, and it laid the foundation for his ensuing success in building the Air Force's missile and satellite program.

[105] Houchin, 114-115.

[106] Houchin, 114-115.

though barely discernible at this point in the history, becomes increasingly relevant in the coming years.

General Schriever proved a remarkable leader in the face of WDD's sudden growth. Expanding his division to include both satellites and IRBMs in fact had little effect on Atlas' progress. WDD was able to continue on track, hitting its planned timetable for Atlas flight testing in June 1957 and would eventually deliver Atlas to SAC only three months later than originally forecasted.[107] It also found room within this period to capitalize on the Navy's Polaris-driven solid fuel technology. In early 1956, Schriever submitted initial plans for Minuteman.

As for WS-117L's progress, on 2 April 1956, not two months after the program moved to WDD, Schriever's team produced a full-scope system development plan that envisioned the satellite's completion by late 1963. Cutting more than a year off the system's originally forecasted deployment date, the plan called for operational testing for the reconnaissance satellite system to "consist of three progressively more sophisticated payloads: the Pioneer version (photographic and electronic), the Advanced version (also photographic and electronic), and the Surveillance version (photographic, electronic, and infrared)." SAC would gain operational control of the system with the initiation of these tests in March 1960.[108] Unfortunately, economics, election politics, and Air Force priorities would converge to extend this target.

The fact that WDD submitted this plan seven months prior to Eisenhower's reelection offers the opportunity to make an interesting observation reflective of the Air Force leadership's focus during this timeframe. Schriever, in the April 1956 report

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[107] McDougall, 129; and Neufeld, 205.

discussed above, projected total R&D costs for WS-117L at $114.7 million. To initiate this development plan according to its timetable, he requested an initial FY 1957 outlay of at least $39.1 million.[109] Given the election year and Eisenhower's "New" New Look campaign platform, which (not surprisingly) called for defense budget cuts, the Air Staff was planning accordingly. On 24 July, Air Force Headquarters approved Schriever's plan as submitted but with one minor exception: "development was authorized within a funding limitation of $3 million for [FY] 1957."[110] In other words, the Air Force called for its reconnaissance satellite program to begin hardware development *under a 93 percent funding cut!* In stark contrast, however, Atlas funding faced similar external political constraints, but its budget fared substantially better.

Atlas' FY 1956 budget was $336 million. Operating on a two-year cycle, WDD submitted a request for $1.335 billion as the program moved into testing.[111] The Air Staff cut this proposal to $1.135 billion, or only a 15 percent reduction.[112] Just as noteworthy is the fact that these disparate appropriation decisions were never questioned at levels above the Air Force, which indicates that as of summer 1956, the Air Force's reconnaissance satellite was not a high national priority item either. Ironically, three weeks prior to Air Force leadership signaling with its purse strings that its R&D focus remained securely locked on the ICBM and *not* on the satellite, unimpeded over the skies of Leningrad and Moscow, the U-2 was making its first operational test flights. Within a year, "Project Aquatone," the CIA's airborne strategic reconnaissance platform, would be

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[108] Perry, 55, 56, and U.S. National Reconnaissance Office, *The CORONA Story*, (n.d.), 4.

[109] Perry, 56.

[110] Perry, 56.

[111] McDougall (p. 127) cites even higher figures for FY 56 and FY 58: $515 mil and $2.1 bil respectively.

providing Eisenhower over 90 percent of America's total intelligence on its Cold War adversary.[113]

By early 1957 signs indicate that for the first time the Air Force was beginning to take its organizational interest in space to the American public. In February, before the House Appropriations Subcommittee, General White noted that "missiles are but one step in the evolution from manned high-performance aircraft to true manned spacecraft; and in the [air] force's structure of the future…we will have all three systems."[114] That same month, General Schriever said in a public address in San Diego, "about 90 percent of the developments in the ballistic missile program can be applied to advancing in space, satellites and other vehicles."[115] Indeed, the 1 April 1957 issue of *Time* magazine had "Missileman Schriever" gracing its cover. "'We have the know-how to hit the moon right now,'" the accompanying article quoted WDD's commander as saying.

> "The ballistic missile program has established the resources to move into space. Man is inquisitive. He's going to keep pushing at the frontiers. … Several decades from now the important battles may not be sea battles or air battles but space battles, and we should be spending a certain fraction of our national resources to ensure that we do not lag in obtaining space supremacy."[116]

With the Air Force now beginning to float among a broader audience its long-range designs beyond the atmosphere, there are three observations worth noting, which prepare the ground for the events that lie ahead. First, as of 1957, still the only expression available to describe what the Air Force saw as its operational domain was "air and

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[112] Neufeld, 141.

[113] Peebles, *Dark Eagles,* 38, 39.

[114] Congress, House, Committee on Appropriations, *Department of Defense Appropriations for 1958: Hearings before the Subcommittee of the Committee on Appropriations*, 85th Cong., 1st sess., 1957, pt. 1, 32, as cited in Futrell, 545-546.

[115] Futrell, 545.

space." Aerospace was already apparent within the service as an idea, but the word itself had yet to be coined.

Second, the word's absence makes clear articulation of the concept it describes an exercise in nuance; the line between expressing "air and space" as one environment and expressing it as two is a line easily crossed. Take for example General Schriever's quote from above. His choice of words—"the important battles may not be sea battles or air battles, but space battles"— implies a perspective antithetical to the aerospace concept.

Third, with the Air Force beginning to express publicly its organizational interest in space, the argument justifying such interest would increasingly be put to the test. Yet, there is little evidence to indicate that the considerations and implications of extending Air Force operations further upward, from an intellectual perspective, had been reflected upon much at all by this point. Following World War II, scholars such as Bernard Brodie, Walter Lippman, and Henry Kissinger (among many others to follow) had ushered air power theory down the theoretical paths of deterrence theory, paths that General Arnold foreshadowed in his 1945 report to the Secretary of War. But with technologies emerging to enable the potential of operations beyond the atmosphere, no one in or out of the Air Force had yet asked the question "Why space?," let alone answered it.

Indeed, by 1957 it was becoming apparent that the move outward beyond the atmosphere might drastically alter some of air power's traditional characteristics. Critical distances would no longer be the hundreds of miles that separated based aircraft from their targets; rather, they were the hundreds of feet around a target an ICBM warhead

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[116] "The Bird & the Watcher," 20.

would likely land. Time, previously measured in hours and days, was becoming a factor of minutes and seconds. And perhaps most significantly of all, the potential of satellites orbiting overhead freely would not only challenge traditional air space sovereignty issues, but also provide air power—for the first time in history—an element of persistent presence. Leghorn's work in the area of strategic reconnaissance reflected breakthrough thinking in this regard and certainly Kecskemeti had begun to ask the pertinent political questions raised by the presence factor, but outside of these two voices, unlike the twenty-year period prior to the Second World War, when airmen drove air power's intellectual charge, in the decade since, aviators themselves had been conspicuously silent. There is, however, a lone report that sticks out, not for the influence it had within the Air Force (it had none to speak of), rather for its foresight.

In August 1956, Colonel Martin B. Schofield of the Air War College's Evaluation Division presented an interesting paper entitled "Control of the Use of Outer Space." He, like General Arnold eleven years previously, recognized that satellites afforded both a reconnaissance and an attack potential. However, being from a different era, he came to a different conclusion than the former General of the Air Force. Colonel Schofield recommended the establishment of international controls for space.

> The presence of a variety of devastating military forces, of many sovereign states, constantly deployed throughout international space may not be conducive to peaceful living. …It might be sounder for the United States, while it is an early contender in the exploration of space, to use its position of influence to the best advantage by strongly advocating a form of international control over the use of space.[117]

[117] Air Force Air War College, Evaluation Staff, "Control of the Use of Outer Space," Project AU-7-56-ESAWC, 7 August 1956, 25-29, as cited in Futrell, 548-549.

It is unclear if Colonel Schofield had been privy to the inner workings of the Eisenhower Administration. If not, his paper was remarkably insightful. In just five months time, Eisenhower would propose exactly this idea in his 1957 State of the Union Address.

"SPACE FOR PEACEFUL PURPOSES" GOES PUBLIC

Despite Soviet reactions that indicated the contrary, the president's Open Skies offer from July 1955 did not die. Indeed, the Russians themselves reopened the discussion on the proposal the following year. In the wake of the tension created by the Suez and Hungary crises, but encouraged by Eisenhower's recent reelection, on 17 November 1956 Soviet Premier Bulganin sent the president an extensive arms reduction proposal. Therein he readdressed the overflight proposition.

> The Soviet Government… is prepared to consider the question of using aerial photography in the area in Europe where basic military forces of the North American Pact are located and in countries participating in the Warsaw Pact to a depth of 800 kilometers to the East and West from the line of demarcation of the above mentioned military forces.[118]

Eisenhower was reserved in his initial response. Henry Cabot Lodge, American Ambassador to the United Nations (UN), mentioned before the General Assembly on 20 December that "the United States notes with some hope recent indications that the Soviet Union appears willing to consider aerial inspection as a positive factor in the problem of armaments."[119] The New Year however brought new resolve.

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[118] "Declaration of the Soviet Government Concerning the Question of Disarmament and Reduction of International Tension," 17 November 1956, *The Department of State Bulletin* XXXVI, no. 917 (21 January 1957): 92.

[119] "U.S. Determination to Seek Agreement on Disarmament," statement by Henry Cabot Lodge, Jr., *The Department of State Bulletin* XXXVI, no. 916 (14 January 1957): 71.

On 10 January 1957, while addressing Congress on the state of the union, Eisenhower not only renewed his open skies proposal but he expanded the field considerably with a public call for the establishment of international control of space.[120]

> [The U.S. is] willing to enter any reliable agreement which would reverse the trend toward ever more devastating nuclear weapons; reciprocally provide against the possibility of surprise attack; mutually control the outer space missile and satellite development; and make feasible a lower level of armaments and armed forces and an easier burden of military expenditures.[121]

And again, as he had with his Open Skies proposal, Eisenhower supported his "rhetoric" with "deed." Two days later, Lodge presented a memorandum before the UN General Assembly. It represented the world's first proposal for the international control of space technology. The ambassador offered a plan whereby "future developments in outer space would be devoted exclusively to *peaceful and scientific purposes* [by bringing] the testing of [satellites and missiles] under international inspection and participation."[122] It was the earliest public expression of a policy theme that would come to dominate the administration's foreign and domestic public discourse on space in the coming years. The Soviets, however, showed little interest. Cold War arsenals continued to build.

In mid-May, American listening posts detected Soviet missile testing in Russia's south-central region. As of yet, the U.S. had been unable to locate the Soviet ICBM program. Eisenhower immediately authorized a series of U-2 missions to investigate. In early June, the pilot of one of these missions altered his planned course to follow a lone set of railroad tracks that in the distance appeared to lead to a construction site. Analysis

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[120] Futrell, 549; and McDougall, 127.

[121] "Annual Message to the Congress on the State of the Union," 10 January, 1957, *Public Papers of the Presidents, Dwight D. Eisenhower 1957*, 26, as cited in McDougall, 127.

of the mission's subsequent photographs showed the site to be the Soviet Union's SS-6 ICBM test facility.[123]

Knowing now what to look for, further U-2 flights throughout the summer began to fill in Eisenhower's picture of the Soviet's ICBM program. First, no other sites were detected and though he could not know for sure, it appeared that his other intelligence sources might have vastly overestimated the Soviet Union's ballistic missile capability. Second, now Eisenhower was able to keep close tabs on the SS-6's progress. He knew, for example, on 21 August that the Soviets launched their first successful SS-6, just as he knew that its dummy warhead landed in the Pacific Ocean some 4,000 miles away. He also knew of the second test on 7 September and had begun to suspect that a Soviet satellite might soon follow.[124] Complementing the president's picture were CIA data received in mid-June quoting Alexander Nesmsyanov, President of the Soviet Academy of Sciences as saying that "soon, literally in the next few months, the earth will get its second satellite."[125] What Eisenhower didn't know, however, was that Khrushchev was on hand for the Soviet's second SS-6 test as well, and being sufficiently impressed, had authorized a third flight. It was scheduled for early October.

The American public, however, was unaware of these secrets. On the third of October 1957, with an overwhelming supremacy in air power, America believed that democracy clearly held the Cold War advantage. "It was axiomatic that the United States

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[122] Department of State, Historical Office, *Documents on International Aspects of the Exploration and Use of Outer Space, 1954 – 1962* (Washington, D.C.: Government Printing Office, 1963), 38; also quoted in McDougall, 127. Emphasis mine.

[123] Peebles, *Dark Eagles*, 40.

[124] Divine, 32; and Gaddis, 238.

[125] Allen W. Dulles, Director of Central Intelligence, to The Honorable Donald Quarles, Deputy Secretary of Defense, July 5, 1957, in ed. Logsdon, 329.

was both ‘better’ and mightier than its chief rival. The future belonged to it, at least for the foreseeable American century.”[126] The following day, this image would be shattered by the ascent of a lone Soviet rocket carrying *Sputnik I* in its nose.

On the eve of the world’s first satellite launch, the aerospace concept enjoyed a reasonably secure, albeit limited foothold within the Air Force. During the first five years of the Eisenhower presidency, service leadership had directed significant resources toward aerospace-enabling technologies. Under the umbrella of Eisenhower’s “New Look,” ballistic missiles flourished, and while the satellite and BOMI programs lagged in the ICBM’s shadow, together the emergence of these three rocket-propelled systems foresaw a “new look” for the Air Force’s future as well. Moreover, organizational structures rose around these programs to manage their development, which in turn generated room within the service where the aerospace concept could roost and penetrate more deeply. Though little intellectual justification had appeared yet to support the idea, and an occasional tendency by some within the Air Force’s R&D community to over focus on space at times served to undermine it, as of 3 October 1957 the notion that air and space is a single continuum certainly enjoyed much healthier prospects of taking hold within the Air Force than it had five years previously. However, from an external context that continued to generally encourage the concept’s institutionalization came the public appearance in early 1957 of Eisenhower’s “space for peaceful purposes” policy. And when Soviet Union’s dramatic satellite shot thrust the subject of space boldly into the

[126] McDougall, 7.

currents of American discourse, Eisenhower's space policy would emerge to present a powerful undertow that threatened to carry the Air Force's aerospace concept out to sea.

Chapter 5

A Concept Introduced
(Early Objectification, 1958)

On 4 October 1957, the Soviet Union launched *Sputnik I* into perpetual freefall. In perhaps the most dramatic display of technological capability the world had yet seen, the Soviets leapfrogged America's air arm and demonstrated undisputed control of the high ground. To prove this first satellite was neither a hoax nor a fleeting expression of the absolute limit of Soviet technology, a month later they did it again. On 3 November, *Sputnik II* took off from the Siberian steppe, this time carrying in its capsule monitoring and life support equipment for its warm-blooded passenger: a mixed-breed terrier named Laika.[1]

The first of the *Sputniks* was an affront to American pride and prestige. Most Americans understood in October 1957 that both the U.S. and Russia had been pursuing satellite development. That the Soviet Union enjoyed first success, however, shattered the prevailing belief that the United States had no technological rival. As the physics associated with the feat became better understood, so too did its significance: the 184-pound Russian sphere hurtling by every eighty-eight minutes just a few hundred miles above was more than *fifty times* heavier than the 3-pound satellite America had planned

[1] William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998), 198. As planned, Laika died after a week in orbit, a victim of lethal injection.

for its IGY effort. Thus, just as the country was regaining its breath, when *Sputnik II*—weighing in at 1,120 pounds—shot off into space, by virtue of its sheer power, American faith was shaken to the core.

Khrushchev took full advantage of the world stage *Sputnik* gave him.[2] "We now have all the rockets we need," he told the *New York Times* three days following the first launch, "long-range rockets, intermediate-range rockets, and short-range rockets." A month later, with *Sputnik II* in orbit, he boasted, "The fact that the Soviet Union was the first to launch an artificial earth satellite, which within a month was followed by another, says a lot. If necessary, tomorrow we can launch 10, 20 satellites. All that is required for this is to replace the warhead of an intercontinental ballistic rocket with the necessary instruments. There is a satellite for you." These rockets, he added, "now make it possible to hit a target in any area of the globe."[3]

History shows Khrushchev's comments were gross exaggerations. The Soviets in fact had no multiple launch capability and were still years away from the precision guidance equipment necessary to turn a rocket into an effective weapon. Indeed, "throughout the entire Eisenhower administration the Soviet Union's *total* arsenal of functional ICBMs would consist of *four* unprotected and highly visible Semyorkas (SS-6s) based at a single, swampy site south of Archangel. All the rest were imaginary."[4] But, cloaked as it was by an increasingly cold war, the Soviet Premier's rhetoric, and

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[2] For clarity, the discussion that follows uses the word *Sputnik* to describe both satellite launches as a single "event" that influenced American discourse. When the narrative requires reference to either of the two launches specifically, it will be clear in so doing.

[3] Arnold L. Horelick and Myron Rush, *Strategic Power and Soviet Foreign Policy* (Chicago: University of Chicago Press, 1966), 43-5, 49. Also cited in John Lewis Gaddis, *We Now Know: Rethinking Cold War History* (Oxford: Clarendon Press, 1997), 240.

[4] Gaddis, 240.

even more the event that gave this rhetoric its power, had a profound and lasting effect on America.

Most historians argue that *Sputnik* marked the advent of the Space Age.[5] From this study's perspective, however, the event was less a historical watershed than a catalyst. As already demonstrated, the themes influencing the process of the aerospace concept's institutionalization within the Air Force developed well before October 1957; *Sputnik* merely increased the rate and intensity with which they mixed, reacted, and began to settle. Thus, the significance of this Soviet feat lies in the actions that were generated in its wake, and as such, the year that followed *Sputnik* demands particular attention. Indeed, it represents this study's most critical period.

Within a year of the famous launches, the pieces are in place to cast many of this study's findings. During this timeframe, two disparate conceptual currents converged that until this point had developed in relative isolation from each other. The aerospace concept crystallized to frame the Air Force's argument that its operational domain extended beyond the atmosphere. This, coupled with the service's renewed emphasis to further develop its aerospace-enabling technologies and to organize more effectively around them, generally encouraged the concept's further penetration into the Air Force, enough to characterize its institutionalization as entering the objectification phase.[6]

At the same time, however, Eisenhower's national policy of "space for peaceful purposes" also came of age. Under the president's direction—much of it hidden from

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[5] For examples of histories that consider *Sputnik* as marking the beginning of the space age see Walter A. McDougall, *the Heavens and the Earth…*; William E. Burrows, *This New Ocean*; and Robert A. Divine, *The Sputnik Challenge*.

[6] Recalling from Chapter 2, "objectification" is the second phase (of three) in the institutionalization process model this study employs. Specifically, objectification occurs when consensus

public view—policy, legislation, and organizations were promulgated which demanded adherence to a perspective contrary to the Air Force's, namely that space was *not* an extension of the atmosphere, but rather a separate place entirely. In other words, following *Sputnik*, although "aerospace" acquired increasing traction within the Air Force, beyond its organizational walls, an alternative paradigm was coalescing.

To examine these developments more closely, this chapter presents three sections. The first and the third detail the activities broadly summarized above; the chapter's opening section examines developments internal to the Air Force, while its last focuses attention on the administration's chosen course through the post-*Sputnik* turbulence. Bridging these two discussions is a section that concentrates on two months of congressional hearings begun just three weeks following the launch of the Soviet Union's second satellite. Initiated by Senator Lyndon B. Johnson, their purpose was to uncover the cause of America's second place finish in the space race. Where this study is concerned, however, the hearings publicly exposed the interservice rifts that developed during the mid-1950s, which in turn brought America's legislature to a consensus that the military could no longer be trusted to develop the nation's future space capabilities unattended.

Sputnik drew the major thematic currents driving this study to the surface—and toward a resolution. A few years later, the turbulence it initiated would settle, and the aerospace concept would find itself deposited along the bank in a gradually eroding eddy. The dynamics motivating this eventual outcome, however, become apparent already

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begins to form around the idea at lower levels within the organization, but not yet to the point of unquestioned acceptance throughout.

during the year that followed *Sputnik*, and as such, the period demands particular attention.

AIR FORCE ACTIVITY IN *SPUTNIK'S* WAKE

The aerospace concept had begun to take hold within the Air Force prior to October 1957, but its infusion was limited primarily to top leaders, their immediate staff, and those sections of the organization concerned with aerospace-relevant R&D. Moreover, before *Sputnik*, the idea was largely an implicit and unacknowledged one. "Aerospace" was simply a logical construct that extended naturally from the theory upon which the service was built. The extent of the idea's infiltration within the organization could only be inferred through Air Force actions with respect to interservice challenges and through some of the advanced technologies it had chosen to develop. In short, during the first thirteen years of the concept's existence (as dated from late 1944 when General Arnold expressed his first musings on the Air Force's role beyond the atmosphere), the idea of aerospace had penetrated key but only limited strata of the organization.

Sputnik, however, energized this process significantly. The event rejuvenated service interests in space-capable technologies, behind which organizational structures developed to support them. More profoundly, *Sputnik* incited Air Force leadership to express at long last the argument that air and space are one, and emboldened them to begin articulating extensively—both externally and internally—an aggressive new vision for the service built around this idea.

JUSTIFYING THE HIGH GROUND

The argument was initiated by a memo sent to the Air Staff from its Legislative Liaison (LL) bureau on Capitol Hill. The Air Force's LL officers spent their time advocating and coordinating the service's budget interests within Congress, a function which kept them attuned to the pulse of America's legislative body. In early November, with two Soviet satellites passing by overhead every ninety minutes, Congress clamored for an American response. Given that the vast majority of the nation's space-related programs were housed in the military, Air Force LL officers also understood its important underlying questions: "Which agencies within DoD would be involved?" and "To what extent?" Recognizing the potential resources at stake, the liaison team notified Air Force headquarters of the developments and suggested a response. Their memo had far-reaching effects.

Sent to the Air Staff on 7 November, LL implored service leadership to press quickly, publicly, and unequivocally that space was a natural extension of the Air Force's domain. It urged Air Force spokesmen to "emphasize and re-emphasize the logic of this evolution until no doubt exists in the minds of Congress or the public that the Air Force mission lies in space as the mission of the Army is on the ground and the mission of the Navy is on the seas."[7]

Air Force Chief of Staff, General T. D. White, aggressively acted on the advice. On 29 November 1957, he introduced the aerospace concept to the American public in an address to the National Press Club. "Total airpower," the Air Force's leading general declared, "is the sum of a nation's aeronautical and astronautical capabilities." He described "the third medium" as "the medium of space above the earth's surface," and argued that

> The compelling reason for the pre-eminence of air power is clear and unchallenged: those who have the capability to control the air are in a position to exert control over the land and seas beneath…. I feel that in the future whoever has the capability to control space will likewise possess the capability to exert control of the surface of the earth…. We airmen who have fought to assure that the United States has the capability to control the air are determined that the United States must win the capability to control space. In speaking of the control of air and the control of space, I want to stress that *there is no division, per se, between air and space. Air and space are an indivisible field of operations*…. It is quite obvious that we cannot control the air up to 20 miles above the earth's surface and relinquish control of space above that altitude—and still survive. …Missiles, manned aircraft and spacecraft, integrated in the command and control structure of the Air Force would provide functional and system completeness. Both manned and unmanned systems function in an environment that is continuous and undivided.[8]

His words, crafted to open a campaign to convince the public that the Air Force mission extends into space, also marked the aerospace concept's explicit debut. Moreover, they posited the concept's intellectual justification as clearly rooted within the framework of the service's air power theory. Until this point, the idea rested on intuition, assumed but never supported, let alone expressed. White's address was thus a defining event—as of this date, the aerospace concept was explicit, public, and official. The Air Force Chief of Staff also remained engaged with developing the idea.

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[7] Memorandum, Colonel V. A. Adduci, Assistant Director, Legislative Liaison to Assistant Deputy Chief of Staff, Plans and Programs, subj: Policy Coordination Section Activities, 7 November 1957, as cited in Spires, 54.

[8] Thomas D. White, General, USAF, "Perspective at the Dawn of the Space Age," (speech, 29 Nov 1957, Washington D.C., Nat'l Press Club), in *The Impact of Air Power: National Security and World Politics,* ed. Eugene M. Emme (Princeton, N.J.: D. Van Nostrand Company, 1959), 497, 498, 499, 500. Emphasis mine. Also cited in Robert Frank Futrell, *Ideas, Concepts, and Doctrine,* Vol. 1, *Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base, AL: Air University Press, December, 1989), 550; and Spires, 54. The single-word construction of term "airpower" is a common practice. In this study, however, unless quoted specifically that way, the term appears in its two-word form. Each version is interchangeable in meaning.

Just two and a half months later, in a key speech before an Air Force Association national convention, General White reiterated the indivisibility of air and space.

> I look upon the Air Force's interest and ventures into space as being as logical and natural as when men of old in sailing ships first ventured forth from the inland seas… Similarly, ventures into outer space require men who know the air. There are no barriers between air and space. Air and space are an indivisible field of operations… To assure effective operations, there can be no division in responsibility between the control of the air… above the Earth's surface and the space above it.[9]

Thru early-1958, the Air Force's public claim on the high ground proliferated. Within months, a single word to describe the breadth of this domain would be coined, adopted, and eventually infused throughout Air Force basic doctrine. Meanwhile, in public, in the press, before Congress, and to its own, the Air Force's strategic thinkers began to speak freely and enthusiastically about the service's fast-growing aspirations beyond the atmosphere—but not entirely without consequence.

At times, particularly from those most closely associated with Air Force R&D, the enthusiasm was excessive, and from the standpoint of this study, subtly counterproductive. On occasion, the service's aspirations for its future in space could be overstated, which tended to erode the cognitive air-space connection inherent in the aerospace concept. Consider the following two examples.

In late January 1958, Brigadier General Homer A. Boushey, Deputy Director of Research and Development on the Air Staff, presented the case for a lunar base before the Washington D.C. Aero Club. *U.S. News and World Report* made the American public privy to his speech by publishing a condensed version of it the following week. "The moon provides a retaliation base of unequaled advantage," argued Boushey. "If we had a

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[9] Thomas D. White, General, USAF, "Space Control and National Security," *Air Force* 41, no. 4 (April 1958): 83. Also cited in Futrell, 552.

base on the moon, either the Soviets must launch an overwhelming nuclear attack toward the moon from Russia two to two-and-a-half days prior to attacking the continental U.S…. or Russia could attack the continental U.S. first, only and inevitably to receive, from the moon—some 48 hours later—sure and massive destruction." In the midst of the post-*Sputnik* Cold War, Boushey's bottom line no doubt raised eyebrows: "[W]hoever gains the ultimate supremacy of space gains control—total control—over the earth, for purposes of tyranny or for the service of freedom."[10]

Lieutenant General Putt, the Air Force's Deputy Chief of Staff for Research and Development, said as much and more before the House Armed Services Committee in early March. He spoke of Air Force plans to become the U.S. Space Force and eventually to occupy the moon. However, Putt added, the moon was but a stepping-stone. "We should not regard control of the moon as the ultimate means of ensuring peace among the earth *(sic)* nations. It is only a first step toward stations on planets far more distant… from which control over the moon might then be exercised."[11]

Such visions, particularly in 1958, were mirages that tended to undermine the service's more terrestrially-focused ambitions. Worse, their public expression proved counterproductive, when, as we shall see later, administration officials involved in policy decisions critical to this study, took note of them in an understandably unfavorable light. But an organization shifting gears, particularly one as large as the Air Force, rarely does so smoothly, especially in this case where, outside of a subsection of its R&D

[10] Homer A. Boushey, "'Who Controls the Moon Controls the Earth,'" *U.S. News & World Report,* 7 February 1958, 54.

[11] "A Shot at the Moon," *Time,*10 March 1958, 56.

community, most Air Force personnel had had little cause thus far to give operations beyond the atmosphere any serious thought.

In an obvious move to account for this deficiency, Air Force leadership engaged directly with *Air Force Magazine* to publish an edition devoted entirely to the Air Force's future prospects in space. Appearing in March 1958 with "Space Weapons: A Handbook of Military Astronautics" upon its cover, the magazine presented articles that described the new frontier, presented the ballistic missile program in detail, and projected the prospect of manned space. All were geared to inform the service's lay personnel of the vision of tomorrow's Air Force. Most notable, however, was the survey's lead article penned by General White, who used the platform to clarify this vision's foundation.

In a piece titled "Air and Space are Indivisible," White made his message and intent clear. "Manned aircraft, missiles, and piloted spacecraft which are responsive to the command and control structure of the Air Force," he argued,

> are parts of a continuing integrated system. From an operational viewpoint they are a single instrument… In discussing air and space, [therefore] it should be recognized that there is no division, per se, between the two. For all practical purposes air and space merge, form a continuous and indivisible field of operations.[12]

The Air Force Chief of Staff was clearly lashing the service's 1958 vision to an aerospace perspective. And, had the actual word "aerospace" existed by this point, the Air Force's highest ranking officer would no doubt have made good use of the term. The word's first traces, however, had only appeared just as the general's article was going to print.

[12] Thomas D. White, General, USAF, "Air and Space are Indivisible," *Air Force* 41, no. 3 (March 1958): 41; also cited in Lee Bowen, *The Threshold of Space: The Air Force in the National Space Program, 1945-1959,* September 1960, USAF Historical Division Liaison Office, in Jeffrey Richelson, ed. *Military Uses of Space, 1945-1991* (Washington, D.C.: The National Security Archive and Chadwyck-Healey, 1991), no. 00319, Microfiche, 17.

ENTER "AEROSPACE"

It has become a matter of some dispute as to who within the Air Force actually coined the term "aerospace." Frank W. Jennings, a writer and editor in the Air Staff's public affairs office during this period, claimed more recently that he was the first, creating it himself for use in an Air Force News Service release on 8 July 1958.[13] But evidence shows that Jennings was in fact preceded.

Robert Futrell, in *Ideas, Concepts, Doctrine*, Volume I, gives the Air University's Dr. Woodford A. Heflin credit for the term. On 23 February 1958, Heflin published the *Interim Glossary, Aero-Space Terms*.[14] The earliest unhyphenated version of the word appears in a letter dated 25 April 1958 sent from the Air Staff to the Commander of Air University. Therein, Major General Jacob E. Smart, Assistant Vice Chief of Staff of the Air Force, instructed the university to revise Air Force Manual 1-2, *United States Air Force Basic Doctrine,* to reflect the fact that air power had "moved naturally and inevitably to higher altitudes and higher speeds until it now stands on the threshold of space operation." He explained that a new term, *aerospace,* meaning "air and space," had come into being and called for doctrine to be updated to reflect this development. Any revision, noted Smart, should include the statement: "The positioning of aerospace power geographically and/or astronautically may have dominating significance in peace or war."[15]

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[13] Frank W. Jennings, "Doctrinal Conflict over the Word *Aerospace,*" *Airpower Journal* IV, no. 3 (Fall 1990): 52, 56.

[14] Futrell, 553. Jennings cites this publication on in his article as well (p. 55).

[15] Jacob E. Smart, Major General, USAF, Assistant Vice Chief of Staff, 25 April 1958, Letter, "Revision of Air Force Manual 1-2," within "Air University History, 1 January 1958 – 30 June 1958, vol. 4, K239.01 January – June 1958, IRIS No. 4-2917-4, in USAF Collection, Air Force Historical Research Agency, Maxwell Air Force Base, AL (hereafter USAF AFHRA). Also cited in Futrell, 553.

The word did not immediately take hold. In fact, other than internal work assumedly taking place on the Air Force's doctrine revision, there was little indication from within the Air Force that it would survive. However, in late-summer and through the fall, circumstantial evidence of its gradual diffusion into Air Force lexicon began to emerge. In the August 1958 copy of *Air Force Magazine*, the word innocuously appeared twice to mark, in all likelihood, its earliest use in a publicly printed medium. General White employed it in an article with a passing comment on how Soviet air power was "being expanded rapidly, into aerospacepower *(sic)*."[16] Elsewhere in the same magazine, associate editor William Leavitt described the Air Force's burgeoning flight systems as "aerospacecraft *(sic)*."[17] The following month's edition published a picture report titled "NACA's Aerospace Transition into NASA," and used the sub-heading "Aerospace Books" within the magazine's book review section.[18] In late-September, the word "aerospace" garnered a significant exposure boost from the Air Force Association's annual convention. The convention's central display panorama—billed as an "Aerospace World's Fair"—drew nearly 100,000 air force and defense industry visitors.[19] Finally, in November, *Air Force Magazine* underwent a permanent facelift that insured the term would persist before its readership well into the future. Editor John Loosbrock introduced the magazine's new Space Digest section as "a logical extension of our present mission," designed to "contribute to an editorial policy that covers the full

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[16] Thomas D. White, General, USAF, "The Air Force Job and How We're Doing It," *Air Force* 41, no. 8 (August 1958): 37.

[17] William Leavitt, "The Edge of Space… and Beyond," *Air Force* 41, no. 8 (August 1958): 82.

[18] "NACA's Aerospace Transition into NASA," *Air Force* 41, no. 9 (September 1958): 56. See page 98 for "Aerospace Books" subheading.

[19] William Leavitt, "Air Force Association's 1958 Convention" *Air Force* 41, no. 11 (November 1958): 38.

spectrum of American aerospace power."[20] More importantly, the new section brought with it a new subtitle for the periodical itself. Hereafter, *Air Force: the Magazine of Aerospace Power* would adorn its cover.

By the close of 1958, General White had come to embrace the term "aerospace," enough to be comfortable marrying it explicitly with the concept it represented, and to present both together to his mainstream officer corps. In an article published in the Air Force's professional peer-reviewed journal, *Air University Quarterly Review*, and using increasingly familiar language, the Air Force chief of staff took issue with a prevailing notion that *Sputnik* marked the beginning of the Space Age.

> Air and Space are not two separate media to be divided by a line and to be readily separated into two distinct categories; they are in truth a single indivisible field of operations. Space is the natural and logical extension of air; space power is merely the cumulative result of the evolutionary growth of air power. It would be more accurate, rather than to speak of two separate and distinct eras, to adhere to a more descriptive frame of reference, one which would clearly show these phases of man's entry into the universe in their proper perspective. *Precisely speaking, we are and have been operating in the "Aerospace Age."*…From the first military aircraft to enter the inventory—the Wright brothers' pusher-type, skid-equipped airplane—to the futuristic X-15 unveiled in 1958, Air Force goals have changed in degree only; the basics have been constant—greater speed, longer range, and higher altitude.[21]

White's article indicated a renewed focus on an Air Force assertion begun a year earlier. Armed now with a more efficient meme to propel the argument, the Air Force's leading general would launch a concerted effort in January 1959 to reinvigorate and sustain the Air Force's intellectual argument for a lead role in space.[22] This, however, begins a

[20] John F. Loosbrock, "Start of an Eventful Journey—An Editorial," *Air Force* 41, no. 10 (October 1958): 7.

[21] Thomas D. White, General, USAF, "The Inevitable Climb to Space," *Air University Quarterly Review* X, no. 4 (Winter 1958-1959): 3-4. Emphasis mine.

[22] "Meme" is an anthropological term that refers to a unit of cultural information, such as in idea or a pattern of behavior, passed among people through verbal or visual means.

discussion reserved for the next chapter. For the present one, the Air Force's chief of staff was singularly responsible for pushing the aerospace concept into the Air Force's mainstream culture. Three weeks following the launch of *Sputnik II*, he gave it official and explicit recognition. Four months later, he led the charge to introduce it to Air Force personnel. And, as 1958 came to a close, he threw his support behind a powerfully descriptive word that would facilitate the idea's transmission even more.

But words alone, though important, are not sufficient in themselves to institutionalize an idea within an organization, even when championed by its top leader. What an organization does—more specifically, the resources it apportions and the organizational structures it develops—is as important to the process as what an organization says. And in these respects, again, *Sputnik* had a marked affect.

ENABLING THE HIGH GROUND

The Air Force's aerospace-enabling technologies were immediate beneficiaries in the post-*Sputnik* environment. During the prior year, both the reconnaissance satellite and the service's hypersonic aerospace vehicle (BOMI) had languished under the broad defense spending cutbacks of election-year politics. The satellite's funding suffered a 93% trimming; BOMI's funds were shut down entirely.[23] Yet, by 15 November 1957, only two weeks following *Sputnik II*, both programs found themselves back on the table and accompanied soon thereafter by a third that looked beyond just putting Air Force systems into orbit. Indeed, within four months of the Russian spectacle, all three

[23] Clarence J. Geiger, "Strangled Infant: The Boeing X-20A Dyna-Soar," in The Hypersonic Revolution: Eight Case Studies in the History of Hypersonic Technology, Vol. I: From Max Valier to Project PRIME (1924-1967), ed. Richard P. Hallion, 185-377 (Wright-Patterson Air Force Base, OH: Aeronautical Systems Division, 1987), 197. BOMI survived only because the contractors involved had still been trying to salvage their effort. Satellite funding issues were discussed already in the previous chapter.

programs became integral parts of an Air Force plan to move toward routine operations beyond the atmosphere.

The Air Force's Scientific Advisory Board (SAB) needed just five days following the first Soviet launch to issue a report urging Air Force leadership to elevate the satellite program's priority.[24] RAND followed suit with a secret paper that advocated breaking the WS-117L program into three separate systems to accelerate the fielding of a viable reconnaissance platform. Under their proposal, RAND believed the first, and least sophisticated system "could be available about a year from start of work, the second in less than two years, and the third in about three years."[25] Both studies—coupled obviously with the political environment *Sputnik* incited—helped Air Force leadership persuade Secretary of Defense Neil H. McElroy by mid-November to approve "in principle" the acceleration of their satellite program.[26]

Likewise, BOMI's reincarnation followed directly in *Sputnik's* wake. On 17 October, only thirteen days after the historic launch, the Air Force's Research and Development Command (ARDC) delivered to the Air Staff a revised development plan for its hypersonic boost-glide vehicle. The new plan consolidated various offshoots from existing studies into a three-phased program to explore hypersonic flight. Pushing

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Recall as well that these were Air Force directed cutbacks in response to general budget reductions, and therefore, reflect the service's programmatic priorities at the time. See page 144 in chap 4.

[24] Merton E. Davies and William R. Harris, *RAND's Role in the Evolution of Balloon and Satellite Observation Systems and Related U.S. Space Technology* (Santa Monica, CA: The RAND Corporation, September 1988), 85-6.

[25] "Recommendation to the Air Staff: An Earlier Reconnaissance Satellite System," 12 November 1957, The RAND Corporation, in Jeffrey Richelson, ed. *Military Uses of Space, 1945-1991* (Washington, D.C.: The National Security Archive and Chadwyck-Healey, 1991), no. 00602, Microfiche, 2. See also Burrows, 228; Davies and Harris, 86.

[26] Robert F. Piper, *History of the Space Systems Division, January – June 1962,* Vol. I: *The Space Systems Division—Background: October 1957- June 1962*, K243.031 January – June 1962, IRIS No. 897250, ix, in USAF AFHRA. McElroy replaced Charles E. Wilson as Defense Secretary on 9 October 1957.

higher, faster, and farther in each phase, the project would ultimately culminate in the early 1970s as a maneuverable, *manned* orbital aerospace "plane." BOMI's program managers at the Wright Air Development Center (WADC) also found, through a contraction of the term dynamic soaring, a new name for their rejuvenated project: "Dyna-Soar."

Less than a month after its submission, Air Force Headquarters approved the revision.[27] And by March 1958, in his "Air and Space are Indivisible" article from *Air Force Magizine*, General White was heralding Dyna-Soar before the entire Air Force community as programmatic evidence of the service's move toward its aerospace future.

> The next step is the Air Force program to fly at hypersonic speeds, circumnavigating the globe many times before reentering the Earth's atmosphere. As a weapon system, this program will represent the first major breakthrough in sustained piloted spaceflight. With this system it will be possible to resolve many of the problems involved in either placing man on a continuous orbit around the earth or sending him soaring into outer space.[28]

The hypersonic boost-glide vehicle had become the Air Force's—perhaps the nation's—first realistic program to take human pilots beyond the atmosphere.

Meanwhile, as the planners from ARDC's *Air* Development Center in Ohio surged forward with Dyna-Soar, Major General Schriever's team in California also took to action. As commander of the recently renamed Air Force Ballistic Missile Division (AFBMD),[29] and having guided since July 1954 the service's missile and satellite programs, Schriever had long been attuned to the potential of these assets for the Air Force's future. Yet, it was just ten days following the launch of *Sputnik II*, when he

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[27] Geiger, 199, 201-4.

[28] White, "Air and Space are Indivisible," 41.

[29] AFBMD's former name was the Western Development Division. The change—in name only—was affected on 1 July 1957.

directed his long-term planners to organize a proposal "leading to [the] development of man carrying vehicle systems for space exploration."[30] From this effort would come some of America's earliest designs for manned space stations and lunar outposts, not to mention a more terrestrially-focused proposal to put an Air Force pilot into orbit within a capsule.

Taking further advantage of the Sputnik-generated momentum, by year's end, Air Force planners had consolidated all of these (re)emerging aerospace technologies into a broader long-range "Air Force Astronautics Program." Completed on 24 January 1958 and forwarded to the Defense Secretary, the plan gathered into a single framework WADC's Dyna-Soar, Schriever's satellites and rockets, and a Lunar Base System proposal that also was under development at AFBMD. With this five-year forecast, the Air Force requested an additional $155 million atop the $70 million already approved for its FY 58 aerospace-related research budget.[31] Moreover, the plan sought $1.156 billion for 1959 alone![32] Against the doldrums that beset the Air Force's R&D community prior to *Sputnik*, consider that all of the resource developments discussed thus far occurred within the four months that followed it.

Given the breadth of Air Force's emerging vision, naturally the service also began to focus effort on securing a dominant role in the development of manned space flight. As well, interestingly, Air Force leadership now recognized the political significance of this focus. On 31 January 1958, General Putt instructed ARDC to "…expedite the evaluation

[30] *Chronology of Early Air Force Man-In-Space Activity, 1955 – 1960,* January 1965, Air Force Systems Command Historical Publication, Space Systems Division, Office of Information, Historical Division, in Jeffrey Richelson, ed. *Military Uses of Space, 1945-1991* (Washington, D.C.: The National Security Archive and Chadwyck-Healey, 1991), no. 00446, Microfiche, 6.

[31] Bowen, 23, 39; David N. Spires, *Beyond Horizons: A Half Century of Air Force Space Leadership* (Peterson AFB, CO: Air Force Space Command, Spring 1995), 56.

of existing or planned projects …with a view to providing an experimental system capable of an early flight of a manned vehicle making an orbit of the earth." Injecting a sense of urgency, Putt emphasized as "vital to the prestige of the nation that such a feat be accomplished at the earliest technically practicable date—if at all possible before the Russians."[33] Although written in broad terms and put to ARDC as a whole, Putt's memo bore a subject line of "Advanced Hypersonic Research Aircraft," which clearly indicated he was pushing the Dyna-Soar development team at his WADC to accelerate the program's projected 1970 timeframe for orbiting a pilot.

Dyna-Soar's developers, however, faced a significant organizational constraint. Their vehicle, like its BOMI predecessor, relied on a high-performance booster rocket to accelerate and lift it beyond the atmosphere—a rocket of the type under development only at AFBMD. Harkening back to late 1955, when Schriever had rebuffed the BOMI team's request to join hands with the Air Force's missile development organization, again the Dyna-Soar team was out from Ohio knocking on AFBMD's door.[34] Any discussion of speeding up their program would require an organizational willingness from the Air Force's racketeers to join hands.

From his perspective at AFBMD, however, Schriever saw a much faster way to put a man into space. Eschewing the Dyna-Soar team entirely, he extracted and refined the opening segment of the planning work begun in November, and on 25 April 1958, presented ARDC with the "Man-In-Space-Soonest" (MISS) proposal. Schriever's planners proposed that AFBMD could blast a manned capsule into a 150-mile high orbit

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[32] *Chronology of Early Air Force Man-In-Space Activity*, 13.

[33] Letter, Lt. Gen. D. L. Putt, DCS/D, Hq USAF, to Cmdr, ARDC, 31 Jan 58, subj: Advanced Hypersonic Research Aircraft, as cited in *Chronology of Early Air Force Man-In-Space Activity,* 14.

and return it safely to earth within two and a half years.[35] Their bid had little to do with Dyna-Soar and likely much to do—given its name—with getting AFBMD into the Air Force's *manned* spaceflight arena. Quite simply, MISS presented a more efficient, less-costly, and faster alternative to simple manned spaceflight than the complex aerospace vehicle WADC was designing.

Interestingly, Schriever's advocacy for the MISS program stands in stark contrast to the position he held in the fall of 1955 when asked by Air Force headquarters to support the service's IGY satellite bid. Then he had argued that the Air Force should forego efforts to put a metal ball into orbit in order to maintain focus instead on the long-term benefits of fielding a militarily useful satellite. Schriever's support of the MISS proposal (in lieu of Dyna-Soar) however, represents an apparent about-face. As the program name implies, MISS had much to do with military timeliness but little to do with military utility. The reasons for Schriever's reversal remain obscure, but one can surmise that the Soviet Union's political success with *Sputnik* likely had an influence. Regardless, where the Air Force was concerned, MISS would be short-lived. Various factors largely beyond the service's control, which will be examined in more detail later in this chapter, led to its transfer by the end of July out of the Air Force into an entirely separate agency. The events surrounding the proposal's development, however, offer evidence of a subtle organizational tension building within the Air Force's R&D community. AFBMD's focus, with its satellite, lunar base, and MISS proposals—all developing under Schriever's command—was acquiring more of a space character than an aerospace one.

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[34] *Chronology of Early Air Force Man-In-Space Activity*, 14. See p. 142 in chap 4.

[35] Piper, 38.

Schriever's designs notwithstanding, however, a June 1958 communiqué between General Putt and the ARDC Commander shows clearly that Dyna-Soar, from the Air Staff's perspective, remained a key component of the Air Force's operational future. To the Air Force general responsible for the development of the service's next generation systems, Putt wrote:

> It is intended that the DYNA SOAR program will constitute a major Air Force effort to develop a weapon system to succeed turbojet-powered manned strategic bomber and reconnaissance systems…. Weapon systems that evolve from the DYNA SOAR development could operate as aerodynamic, boost-glide vehicles, as short term satellites or satelloids, or as satellites in relatively stable orbits. Further, they could be manned or unmanned, and if unmanned, recoverable or unrecoverable. Combinations of any of these vehicles could be included in the final DYNA SOAR weapon system.[36]

In the summer of 1958, the hypersonic boost-glide system seemed to hold a promising future. Moreover, as a system, it represented the aerospace concept's actualization.

Following *Sputnik*, the potential of the Air Force's aerospace-enabling capabilities grew dramatically. As the service envisioned its operational sphere expanding outward, manned and unmanned space-capable systems had been either put back on or added to a growing list of future programs. Given the resources the Air Force had invested to promote this growth, it is of little surprise that the service's organizational structure also adapted to accommodate it.

ORGANIZING FOR THE HIGH GROUND

Before describing these adjustments, however, two caveats are worth noting. First, like the Air Force's resource decisions, not all of its structural changes encouraged the aerospace concept's institutionalization. Second, because these changes lagged behind the demand that sparked them, and those that threatened the most upheaval tended to proceed at a more tentative pace, evidence of organizational change during the year that followed *Sputnik* comes more as signs of impending change than as actual change itself. The first and most significant of these "signs" appeared just two weeks following the launch of *Sputnik II*.

Under growing public interest to account for America's second place finish in the satellite race, General White gathered a committee of distinguished scientists and administrators led by Dr. H. Guyford Stever to investigate how "the Air Force conducted its program in research and development and to recommend methods by which the Air Force might improve its management."[37] The task proved daunting. The committee conferred for seven months before delivering its assessment.

Released on 20 June 1958, the Stever Report criticized the organizational structure of the Air Force's R&D community for parceling effort into divisions that oversaw systems through the entire development process, from concept to deployment. Such a system-oriented structure, it argued, tended to "stovepipe" programs and led to inefficient duplication. Instead, the committee called for a complete reorganization of ARDC, one which divided Air Force R&D "along the distinct functional lines of the research and development program, i.e., research, technical development, weapon systems, and testing." The report recommended that deputy commanders be put in charge of each of these functional areas and be given responsibility not only of that portion of the Air Force's overall R&D program, but also "of the Centers, laboratories, and other facilities

[36] Letter (S), Swofford, Acting DCS/D to Comdr, ARDC, 25 Jun 58, subj: Selection of Contractor for WS-464L (DYNA SOAR), as cited in Bowen, 35.

[37] Piper, 69-70.

which are directly engaged in their activity."[38] Such changes would tend to obviate the kinds of organizational developments that were occurring at AFBMD and avert issues such as those the Dyna-Soar team faced. More generally, under a Stever-proposed framework, the Air Force's research organizations would be less inclined to associate themselves with specific families of systems and perhaps more inclined to embrace an aerospace perspective.

The Stever Committee generated significant interest within the Air Force. However, restructuring of such magnitude tends to be episodic in nature. ARDC would eventually reorganize, not once, but twice over the coming four years. And what transpired in the end would be somewhat of a far cry from the report's original vision.

Meanwhile, early into the Stever Committee's deliberations, White moved to expand his staff at Air Force Headquarters in order to accommodate the service's growing aspirations beyond the atmosphere. On 10 December 1957, the Air Force created a Directorate of Astronautics to serve as the Air Staff's focal point for all space-related development issues. But leaders in the Defense Department balked immediately. The DoD's Director of Guided Missiles William M. Holaday said, "Apparently, the Air Force wishes to show its ability in this field and see if it can grab the limelight and establish a position."[39] More discreetly, tying the word "astronautics" directly to the Air Force flew in the face of the administration's emerging intent to decouple, publicly at least, America's military and its space programs. Pressure from Holaday as well as Deputy Secretary of Defense Donald A. Quarles forced White to rescind his plans less than a

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[38] (Stever Report, 20 Jun 1958, pp 2-3, in Space Systems Division History Office files, as quoted in Piper, 70.

[39] "Air Force Yields on Space Agency," *New York Times*, 14 Dec 1957, 8; also discussed in Bowen, 20.

week after announcing them.[40] Indeed, until the Eisenhower team was fully prepared to state its official policy on space, the Air Staff was precluded from organizing for it at all.[41] It would be mid-July 1958 before General White finally got his directorate, and even then it was called the Directorate of Advanced Technologies—a name noticeably void of any reference to space.

Geographically removed from the reaches of Washington DC, however, AFBMD was less hampered in adjusting its organizational structure to the changes taking place. Furthermore, its moves reflected the unit's space-centric focus, and further supported the germination of an organizational sub-culture antithetical to the aerospace concept. A significant event encouraging this process—one precipitated in part by *Sputnik* and in part by AFBMD's own success with its ICBM development—was General White's transfer of operational responsibility for all ballistic missiles to the Strategic Air Command (SAC). The decision, effective on 1 January 1958, relinquished AFBMD of a large portion of its missile program,[42] and only emphasized the trend that AFBMD's missile-related functions were diminishing in the post-*Sputnik* environment, while its space-related efforts were ramping up.

Concrete structural changes within AFBMD followed this shift. In mid-June, the division began to "identify positions and recruit personnel for [its] space program."[43] By September, General Schriever had recognized a need to reorganize—"certainly our

[40] "Air Force Yields," 8.

[41] Bowen, 21. Administration developments in this regard will be discussed shortly.

[42] Frederick J. Shaw, Jr. and Timothy Warnock, *The Cold War and Beyond: Chronology of the United States Air Force, 1947-1997* (Washington D.C.: Air Force History and Museums Program, 1997), 22; Piper, 63. White made this announcement during his National Press Club presentation discussed earlier.

[43] Piper, x.

management problems have become more complex, not only because of new programs, but because of rapid growth," he wrote in approving, on 12 September 1958, a structural expansion of his division.[44]

AFBMD added a fourth deputy command directorate to its organizational structure. Of interest though are the organizational implications expressed by the new arrangement. Under its three previous directorates—installations, resources, and technical operations—the division's heart and soul rested within the latter. The technical operations directorate housed the Air Force's future missiles and satellites, as well as AFBMD's heady plans for space stations and lunar bases. On 12 September, however, this directorate was effectively split in two, creating in its place a Directorate of Ballistic Missiles and a Directorate of Military *Space* Systems.[45] Schriever's Deputy Commander for Ballistic Missiles would oversee the maturation of the division's former *raison d'être*. His Deputy Commander for Military *Space* Systems, meanwhile, would help guide its emerging one.

The Air Force's resource and organizational activities in the post-*Sputnik* period was a mixed bag with respect to encouraging penetration of an aerospace perspective within the service. By far, the two most positive were Dyna-Soar's resurrection and the Stever Report's recommendations. Alternatively, however, General Schriever's R&D team in California—a critical R&D component of the Air Force's emerging aerospace capability—seemed by the fall of 1958 to be embracing a decidedly space-centric focus. All of these developments, however, took place within a small subset of the Air Force. They were important to the service's future for sure, but not mainstream enough to

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[44] Memo, Maj. Gen. Bernard A. Schriever, Cmdr AFBMD, to Col. C. H. Terhune, 18 Sep 1958, subj: STL Manpower and Funding Requirements, as cited in Piper, 68.

[45] Piper, 68.

significantly disaffect the aerospace concept's near-term progress toward institutionalization within the Air Force as a whole.

From a broader service-wide perspective, however, it is difficult to overstate the degree to which the aerospace concept had further penetrated the Air Force during the year that followed *Sputnik*. The event rejuvenated the service's aerospace-related technologies and propelled its R&D structure toward a major reorganization. But far more importantly, *Sputnik,* as it had the rest of the world, inspired airmen to think. Amidst the defense community's rush to respond in its wake, Air Force leaders found themselves forced at last to develop an explicit argument for why the service's future included the domain beyond the atmosphere, an argument predicated on the notion that air and space are one. Mainstream Air Force personnel became exposed, many no doubt for the first time, to an organizational vision that saw Air Force pilots flying higher, faster, and further, and at the controls of crafts capable of traversing the expanse of the boundless environment above. It was no doubt a heady and exciting time for the service. Many outside it, however, including those to whom the Air Force answered, were not so impressed.

THE JOHNSON HEARINGS

Like Khrushchev, Eisenhower's political opponents also seized the opportunity *Sputnik* presented. Three weeks into November, with public confidence in the President sinking and editorials across the country demanding a tough American response, Lyndon B. Johnson, the Senate majority leader, launched an inquiry into America's satellite and missile programs.[46] "With the launching of *Sputniks I* and *II*, and with information at hand of Russia's strength, our supremacy and even our equality has been challenged," declared the Senator at the opening of his proceedings. "[W]hen the testimony is finished, we will have a clear definition of the present threat to our security, perhaps the greatest that our country has ever known…. Our goal is to find out what is to be done…. [t]o determine what can be done, what should be done, what must be done now and for the long pull."[47]

The Johnson Hearings are important to this study for three reasons. First, they presented the Air Force a national forum from which to pitch its aerospace concept. Second, they reflected the American public's pulse with which Eisenhower had to contend in the post-*Sputnik* environment. Third, and most importantly, they exposed the depth and character of the rifts that had developed among the services during the mid-1950s resource battles, rifts whose publicity would shape the character of the nation's budding space program and influence it for years to come.

Johnson's inquiry peeled back the layers of America's space and weapons programs and bared them to the public. In three different sessions that dominated the nation's daily headlines from mid-November through early January, experts and officials from the private and public, civilian and military sectors were called to testify. "We will not reach [our] goal by wandering up any blind alleys of partisanship," Johnson warned.[48] Noticeably absent from the list of witnesses, however, were some of the administration's

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[46] See Robert A. Divine, *The Sputnik Challenge* (New York: Oxford University Press, 1993), 44-45 for discussion on America's mood during this period.

[47] Congress, Senate, Committee on Armed Services, *Inquiry into Satellite and Missile Programs: Hearings before Preparedness Investigating Subcommittee of the Committee on Armed Services*, 85th Congress, 1st and 2nd sessions, November 25, 26, 27, December 13, 14, 16, and 17, 1957, January 10, 13,15, 16, 17, 20, 21, and 23, 1958, (Part 1), 2-3.

key advisors—Killian, Gardner, Land, and Bissel, for example—who were intimately involved in forming the early space policy of the mid-fifties. Moreover, Johnson refrained from direct attacks on the president by letting those scientists and public figures he did call upon speak for themselves about the Soviet Union's acquired prowess in space and missiles. Meanwhile, through counsels serving as his primary interrogators, the senator pursued a line of inquiry that relentlessly emphasized budget mismanagement rather than misapportionment. Johnson's intention was clear: America had squandered its long-held Cold War advantage not because of funding shortfalls, rather because of how these funds had been managed. His approach, combined with a disciplined restraint from engaging in partisan attacks, allowed Democrats to take the political high road: they could undermine the Republican administration without ever undermining Eisenhower specifically.[49]

An important conclusion from the hearings was already drawn by late-November as the first round of testimony ended. Hammering away at science, manufacture, and public officials during the opening session, Johnson's lawyers painted a picture that interservice rivalry and bureaucratic confusion had led to waste and duplication in America's missile effort.[50] "There is general agreement among some hundred people that we have interviewed," said Senator Johnson, "that… the United States urgently needs to bring its missiles [and] satellite program under an independent commission."[51]

During the subsequent two sessions, the general image the military presented of itself only strengthened this conclusion. *Sputnik* historian Robert A. Divine notes that with the

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[48] Senate, *Inquiry* (Part 1), 3.

[49] Divine, 64.

[50] Divine, 66.

start of the second phase, “The hearings began to degenerate into a military sour grapes session.”[52]

ARMY TESTIMONY

The Army made its beef clear from the outset. Its first witness, Army Chief of Staff General Maxwell D. Taylor, denigrated the defense establishment for failing to recognize that the surface-to-surface ballistic missile—no matter what its range—was a “natural transition from so-called conventional artillery.”[53] The ballistic missile, therefore, should have been an Army responsibility. But of greater concern, argued Taylor, was the long-term cost of Eisenhower’s New Look strategy, which had stripped the Army of much of its conventional ground capability at a time when Soviet nuclear parity most demanded it. “[W]ithin the comparatively limited budgets we have had to work with, to a large extent, we have had to pay for the missile program out of what you might call conventional equipment.”[54]

Lieutenant General James M. Gavin, the Army’s Deputy Chief of Staff for R&D, also criticized the administration. He found it “tragic” that America had not gotten to space first and blamed the failure on a “wrong decision” by senior administration leadership.

> *Senator Johnson:* What was the decision that was wrong? Which decision do you refer to?
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> *General Gavin:* Well, this has been a rather difficult experience…. [T]he first decision was made in August of 1955… [when the Army’s] Project Orbiter as it was known as, would not be adopted as the national satellite

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[51] Senate, *Inquiry* (Part 1), 856-7.

[52] Divine, 67.

[53] Senate, *Inquiry* (Part 1), 476.

[54] Senate, *Inquiry* (Part 1), 477.

> program…. In the spring of 1956 we made [another] proposal to the Department of Defense…. On the 15th of May [that year], I received a directive telling me in specific terms that the Army would not prepare to launch a satellite…. [A] couple of months later… we… reopened the issue and urged that we be allowed to go ahead and provide the country with a satellite, estimating that we could fly one by midsummer of 1957; this is just this past summer. Again it was turned down…. This has been a very frustrating—and that is an understatement—experience, to have been through in the last two years.[55]

Major General Medaris, commander of the Army's ballistic missile program (ABMA), added further support. He too voiced the Army's long-held position on ballistic missiles by praising Soviet wisdom on the matter: "I have to agree… with the conclusion that missiles as an extension of artillery should be in the hands of the ground forces, and with the conclusions of the Russians who have committed their missiles entirely to their army force… in my professional opinion that is where they belong."[56]

Army spokesmen were also clear on their beliefs about the importance of space to national security. General Gavin argued that satellites, given their reconnaissance, weather forecasting, and mapping potential, should have higher developmental priority than missiles.[57] Medaris discussed the high ground's importance more generally. To him, the advantage space offered in controlling the earth's surface was as undeniable as the ascent of warfare to secure that advantage was inevitable.[58] Driving home the point, Dr. von Braun also presented the Soviet view. "They consider the control of space around the earth very much like, shall we say, the great maritime powers considered

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[55] Senate, *Inquiry* (Part 1), 509-10.

[56] Senate, *Inquiry* (Part 1), 572; also cited in Peter L. Hays, "Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War" (Ph.D. diss., The Fletcher School of Law and Diplomacy, 1994), 126.

[57] Senate, *Inquiry* (Part 1), 505.

[58] Congress, Senate, Committee on Armed Services, *Inquiry into Satellite and Missile Programs: Hearings before Preparedness Investigating Subcommittee of the Committee on Armed Services*, 85th Congress, 1st and 2nd sessions, January 6, 8, 9, 10, 13, 14, 15, 16, 17, 20, 21, and 22, 1958, (Part 2), 1706-7.

control of the seas… and they say, 'If we want to control this planet, we have to control the space around it.'"[59] But Army Secretary, Wilbur M. Brucker was clearest about the Army's intent.

> The Soviets' recent satellite successes have emphasized the importance of conquering the problems of outer space. It is imperative that we now demonstrate to the free world our capabilities in the field of satellites and space vehicles. We must undertake a military, as well as a scientific, program that will accomplish far-reaching scientific advances into space.
>
> The Army has a unique capability to make significant and early contributions in this conquest of space. It has not only the ability with existing equipment to begin launching small satellites almost immediately, but it has an incomparable reservoir of experience in rockets, guided missiles, ballistic missiles, and space vehicles.[60]

Three days of Army testimony left the impression that getting into space was crucial, that at the very least the Army should have a part if not the lead in that process, and that had the administration not hamstrung Army satellite efforts to this point, America would have been there already.

NAVY TESTIMONY

The Navy's turn before Johnson's panel was significantly undercut by an unforeseen misfortune. Only eight days earlier, and preceded by great fanfare, the free world held its breath as the Navy's *Vanguard I,* the nation's first attempt to answer *Sputnik*, inched cumbersomely into the air, reached an apex of about fifteen feet, and then settled back onto its launch pad crumpled and awash in flame. Dubbed "Kaputnik" by the press, LBJ's reaction to the humiliating failure reached all the major wires the following day: "I shrink a little inside whenever the U.S. announces a great event and it blows up in our

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[59] Senate, *Inquiry* (Part 1), 597; also cited in Hays, 126. The Soviet position was very much like the one General White presented during his National Press Club speech only three weeks before.)

[60] Senate, *Inquiry* (Part 1), 464.

face."[61] A week later, before the same Texas senator, Navy officials would be conspicuously silent on the issue of naval space development.

Navy Secretary Thomas S. Gates, Jr. all but ignored the subject in his opening statement—"We can help with the national effort to explore outer space" was his only mention of it in his 2000-word submitted testimony. Indeed, faced with considerable grilling over the Vanguard failure, naval leadership seemed anxious to avoid the subject of space. Johnson's counsel finally queried Assistant Secretary of the Navy (Air), Garrison Norton, specifically on the service's designs beyond the atmosphere. "The Navy has not tossed its hat in the ring here as a competitor with the other two services in the production of hardware that will get you into outer space," he said. "We have no desire to enter into the competition here to take over vehicles in that direction." He spoke of a naval interest in the products of satellite reconnaissance and navigation and testified to its "considerable capability in this field," but he emphasized that the Navy "would be glad to put this capability at the disposal of whatever agency or whatever service is designated as either a single manager or the chief [of] this satellite capability."[62]

While silent on the subject of space, however, naval officials, like their Army counterparts before them, voiced their frustrations over administration-driven defense funding shortfalls, particularly in ballistic missile development. The Chief of Naval Operations, Admiral Arleigh A. Burke, testified, "[W]e have asked for more money to accelerate our [missile] programs to keep them on the schedules that we think they should

[61] Divine, 71.

[62] Senate, *Inquiry* (Part 2), 1757.

be on," but to no avail.[63] Burke cited that the administration had given only $371 million of the $960 million the Navy had requested for its FY 1958 missile program.[64]

Mr. Norton also supported Burke's perspective, as did the Director of the Navy's Guided Missiles Division, Rear Admiral J. E. Clark. "Congress has given us everything we have asked for," said the assistant secretary, but cutbacks to Navy's requested R&D budgets "seriously hampered [naval R&D by] delaying the ultimate manufacture or operation of the weapons that we need for the defense of the United States."[65] Clark was more direct. Asked what needed to be done to better the U.S. missile position against the Soviets, he said, "[F]irst, increase the funding. Second, smooth out the administrative process in the Department of Defense. …[T]he structure… that is directly connected with the development programs is a satisfactory structure. The structure that has to do with the handling of funds is not."[66] Their statements contributed a general theme pitched by all of the Navy's spokesmen: America's (apparent) security woes in the post-Sputnik era were the result of misplaced priorities within the administration.

AIR FORCE TESTIMONY

Naturally, on the national stage the Johnson hearings presented, the Air Force pushed its agenda as well. They agreed with the Army that space was crucial to national security, but disagreed with them on which service should have responsibility for its development. Although the word was still two months away from being coined, Air

[63] Senate, *Inquiry* (Part 1), 755.

[64] Senate, *Inquiry* (Part 1), 753.

[65] Senate, *Inquiry* (Part 1), 705, 692.

[66] Senate, *Inquiry* (Part 1), 756.

Force Secretary James A. Douglas used the aerospace concept to push the Air Force view.

> Ballistic missiles are viewed by the Air Force as continuations of [an] evolutionary process. …[L]et us remember that 54 years ago today the Wright Brothers flew the first powered aircraft. It was many years before its military implications were realized. In the late 1940s jet bombers were the weapons of tomorrow and ballistic missiles the weapons of the day after tomorrow. …The present day analogy is, of course, satellites and space flight, where Air Force studies started in 1946 have led to present programs of great possibilities. …I recount this continuity of development efforts to illustrate the fact that *there is no easily recognized boundary between the atmosphere and space. The one merges into the other* and we must learn to use both.[67]

Over the next two days and again in early January, as testimony reconvened following the holiday, Air Force leaders reiterated this theme time and again. When Senator Johnson queried General White on the role of "the Air Force in this space age," White replied:

> [I]t seems to me that space is a contiguous element to the earth's atmosphere. The earth's atmosphere, of course is the element of the Air Force in that were the Air Force not to play a dominant part in any space developments is about like saying that the Navy will operate submarines up to the surface and above the surface somebody [else] takes over, … [68]

At another point, White presented his views on the probable evolution of the military's space capabilities:

> I actually foresee the use of weapons in space, both offensive and defensive. I can imagine a satellite being a missile launching platform. It is possible to put out one of those things in space, and have it go over any given spot on the earth and at a given signal,… have [it] fire a missile at a given point on the earth, a certain city, for example. I think that if that is possible, that concomitantly there should be developed a defense against this kind of satellite.[69]

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[67] Senate, *Inquiry* (Part 1), 840-2. Emphasis mine.

[68] Senate, *Inquiry* (Part 2), 1588.

[69] Senate, *Inquiry* (Part 2), 1587.

General Schriever, also was called to testify, reiterated these themes.

> *Senator Johnson:* I want to ask you, what about the Air Force role of putting the Air Force into outer space?
>
> *General Schriever:* Well, my feeling is this: that from a mission point of view, there is a great deal of similarity in operating in the air, in the atmosphere above the earth, and in operating in space…. I think that it normally follows mission-wise. …I made a statement a year ago that at least 90 percent of what we are doing in the Air Force ballistic missile program, 90 percent of all this work can be directly applied to an astronautics or space program. And so, from a technological standpoint, it is, I think, a normal transition to step from these ballistic missiles into satellites, moon rockets, going to planets. …
>
> *Senator Johnson:* And you consider control of outer space extremely important to the free world, do you not?
>
> *General Schriever:* Well, I certainly do, although I would not be able to give you exactly why in tangible terms, again, a year ago, that I thought perhaps the future battles would be space battles instead of air battles, and I still feel that way about it.[70]

In sum, through the Johnson Hearings, the Air Force reiterated its position on space: where national security was concerned, this new region of operations, held a military significance no different than the atmosphere's. By extension, the logic of air power theory applied there as well, which in turn made the argument for why the Air Force should oversee military development of the realm—at least in *their* eyes—an axiomatic one.

The testimony of the three services was predictable. So too, unfortunately, was the general perception that emerged after two months of Senator Johnson's far-reaching inquiries. Finger pointing and shoulder shrugging had left before the committee images of a Defense Department beset with parochial turf battles among the services, images which carried a consequence. In a speech before the Democratic caucus just two days

[70] Senate, *Inquiry* (Part 2), 1649.

before Eisenhower's 1958 State of the Union Address, Senator Johnson summarized his thoughts on the *Sputnik* issue:

> That the Soviet achievements are tangible and visible while ours are not, is a result of policy decisions made within the governments of the respective nations. It is not—as yet, at least—the result of any great relative superiority of one nation's science over the other's. *The heart of the matter then is the national policy of each of the two great world powers*…. Control of space means control of the world, far more certainly, far more totally than any control that has ever or could ever be achieved by weapons or by troops of occupation…. The urgent race we are now in—or which we must enter—is not the race to perfect long-range ballistic missiles. There is something more important than any ultimate weapon. That is the ultimate position—the position of total control over earth that lies somewhere out in space.[71]

Johnson implored the administration to accelerate its missile program, strengthen its military, and leverage America's technological might by shortening development times. He also called for the establishment of a new advanced-weapons development agency *outside* of the Defense Department.[72]

While military leaders had conveyed their belief of space's importance in national security, they had given Congress no confidence in their ability to manage its development. Instead of winning supporters, the armed services convinced America's legislators that, to paraphrase Georges Clemenceau, space was too important to be left to the generals. Indeed, through Johnson's influence in the coming months, Congress would come to hold a view similar to the one solidifying by this point within the Eisenhower administration. In fact, "there [would be] no significant political debate concerning civilian versus military control [of space]; both the Congress and the

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[71] Lyndon B. Johnson, Senator, "How Lyndon Johnson Sizes up the State of the Union. (Text of speech delivered to the Democratic Caucus, Washington, D.C., 7 Jan 58)," *U.S. News and World Report*, 17 January 1958, 100-101; parts also cited in Divine, 79. Emphasis mine.

[72] Johnson, 102.

executive branch preferred, and even took for granted, the concept of civilian control."[73] Their reasons for doing so, however, differed considerably.

ADMINISTRATION ACTIVITY IN *SPUTNIK'S* WAKE

Ironically, as it had for his political opponents at home and his ideological foes abroad, *Sputnik* presented Eisenhower opportunities as well. Despite the political turbulence that filled the Soviet achievement's wake, the president was able to hold true to, and in fact solidify, the space policy course he first charted two and a half years earlier. While his opponents made hay from the satellite launches, Eisenhower garnered leverage from them.

With regard to space, two paths of presidential action developed within the post-*Sputnik* period. The first aimed to keep outer space free and peaceful. The second focused on protecting and improving the nation's overhead strategic reconnaissance capability. Motivated by Eisenhower's goal to stem the Cold War arms race, the first path entailed a host of policy, organizational, and diplomatic moves to establish civilian control over America's space program and de-militarize it to the greatest extent that national security would allow. The second path, enshrouded in deep secrecy, necessarily followed a more delicate course whose progress, compared to the first, was more constrained. Eisenhower placed the reconnaissance satellite's developmental priority on par with America's strategic missiles and, as he had with the U-2, stripped its most promising aspects from Air Force control.

[73] Robert H. Puckett, "American Space Policy: Civilian/Military Dichotomy," *The Air University Review* XVI, no. 3 (March-April 1965): 45.

Paradoxically, these two paths of action were both counterproductive and mutually reinforcing to one another. Flying top-secret reconnaissance satellites while espousing a policy of space for free and peaceful purposes held that policy's legitimacy squarely at risk. At the same time, however, the information these satellites could gather would provide the president confidence to pursue the policy.[74] Indeed, a free and peaceful space even offered a convenient cover for his orbital spy cameras. Most importantly, from this study's standpoint, both paths demanded adherence to a perspective on space that directly challenged the aerospace concept.

INITIAL STRATEGIZING

Eisenhower's plan crystallized in a historic staff meeting with his key advisors four days after the first satellite launch. One option, supported apparently by some of the Air Force's senior leaders, was to formally protest *Sputnik's* overflight as a violation of America's sovereign air space.[75] Doing so, however, would have undermined the administration's expressed intent in NSC 5520 (May 1955) to establish the principle of "freedom of space." Indeed, a salient observation by Deputy Defense Secretary Donald Quarles made an alternative strategy far more advantageous. "The Soviets," he said,

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[74] The argument presented here challenges somewhat the conclusions of well-respected historians, whose analyses have preceded this effort. Typically, those who have examined this period conclude that Eisenhower's desire to have a space-based reconnaissance capability was the underlying motive for his "space for peaceful purposes" policy campaign. Sometimes referred to as a "stalking horse strategy," peaceful intent in space was simply a guise that gave the president diplomatic maneuvering room to establish a top-secret reconnaissance presence there. The author of this study, however, comes to a somewhat different conclusion, one that places far more weight on the president's altruistic desire to stem the arms race and ease Cold War tensions. This issue receives little direct attention within the thesis body because the motive behind Eisenhower's policy makes little difference in the policy's role to negate the aerospace concept's institutionalization within the Air Force. For examples of alternative positions, see McDougall, 118-123; Gaddis, 245; and Spires, 41.

[75] Delbert R., Jr. Terrill, *The Air Force Role in Developing International Outer Space Law* (Maxwell Air Force Base, AL: Air University Press, 1999), 29, (see footnote at page bottom).

"might have 'done us a good turn,' unintentionally, in establishing the concept of freedom of international space."[76]

Quarles's comment defines a critical moment. By accepting *Sputnik* without protest, Eisenhower would seal a tacit *de facto* agreement between the Cold War adversaries that each would refrain from laying sovereign claims to the region above the atmosphere. The decision, by extension, would also establish a functional definition of the realm: without defining where it began, objects would be considered to be in space when they were in orbit.[77] Thus, *in an executive decision* Eisenhower made on 8 October 1957, quietly but with measured intent, space became a separate place. Eisenhower likely saw as well that his chances to fashion freedom of space into freedom of space for *peaceful purposes* had also just increased thanks to the Soviets. He insisted at the meeting that America's burgeoning space program remain "free from military weaponry to the greatest extent possible."[78] Quarles returned to the Pentagon and directed the Air Force "not to consider nuclear weapons in its future space planning. This extended to even the

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[76] As quoted in Divine, 6. Also referenced in Dwight D. Eisenhower, *Waging Peace: The White House Years, 1956-1961* (Garden City, NY: Doubleday & Company, Inc., 1965), 210; U. S. Department of State, "Memorandum of a Conference, President's Office, White House, Washington, October 8, 1957, 8:30 a.m." in *Foreign Relations of the United States, 1955-1957,* Vol. XI: *United Nations and General International Matters,* ed. Lisle A. Rose, 755-756, (Washington, D.C.: Government Printing Office, 1988), 755; Walter A. McDougall, *…the Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985; Baltimore: The Johns Hopkins University Press, 1997), 134; and R. Cargill. Hall, "Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program,* vol. I, *Organizing for Exploration,* ed. John M. Logsdon (Washington, D.C.: NASA History Office, 1995), 228.

[77] Matthew J. Von Bencke, The Politics of Space: A History of U.S. – Soviet/Russian Competition and Cooperation in Space (Boulder: Westview Press, 1997), 42.

[78] State Department, "Memorandum of a Conference," 755.

suggestion of an offensive mission."[79] Meanwhile, before Eisenhower could proceed with his agenda, he had to address an increasingly uneasy American public.

The president's public statements backed this strategy. "We congratulate Soviet scientists upon putting a satellite into orbit," said the president the following day. He also assured the nation that America would not be far behind with its own. As for the imminent threat some claimed already that *Sputnik* posed, "[it] does not raise my apprehensions, not one iota. I see nothing at this moment, at this stage of development, that is significant… as far as [our] security is concerned…"[80]

A month later, in a national address four days after *Sputnik II's* launch, Eisenhower sought to make "as strong a case for confidence and sane direction as [he] could."[81] He reiterated the necessity of maintaining the balance between "a sound defense and a sound economy." Contrary to a growing call from the nation's lawmakers, Eisenhower remained adamant about avoiding an arms race in space.

> What the world needs today, even more than a giant leap into outer space is a giant step toward peace.… Never shall we cease to hope and work for the coming of the day when enduring peace will take these military burdens from the back of mankind, and when the scientist can give his full attention, not to human destruction, but to human happiness and fulfillment.[82]

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[79] Curtis Peebles, *High Frontier: The U.S. Air Force and the Military Space Program* (Washington D.C.: Air Force History and Museums Program, 1997), 11; also in Hall, ed. Logden, 229, (see footnote 72).

[80] Dwight D. Eisenhower, "The President's News Conference of October 9, 1957" in *Public Papers of the Presidents, Dwight D. Eisenhower 1957*, 730, 734.

[81] Eisenhower, *Waging* Peace, 225.

[82] Dwight D. Eisenhower, "Radio and Television Address to the American People on Science and National Security," 7 November 1957, in *Public Papers of the Presidents, Dwight D. Eisenhower 1957*, 798-9.

In his memoirs sometime later, Eisenhower recalled his determination during this period to keep from turning "the nation into a garrison state."[83]

IMPLEMENTING CIVILIAN CONTROL

The president also used this November address to begin moving forward with his policy agenda. He announced the appointment of Massachusetts Institute of Technology (MIT) President Dr. James R. Killian, of TCP fame, to the newly established position of Special Assistant to the President for Science and Technology.[84] Killian would advise on scientific issues and provide direction for the government's missile and space efforts, and one of his first efforts in this capacity—at Eisenhower's request—was to explore possible alternatives for reorganizing the nation's space program.

On 29 December, while Johnson was on Capitol Hill probing America's current space program and within the Pentagon, the Air Force was crafting its version of tomorrow's, Killian delivered his thoughts on the issue to the White House. He made two important recommendations for the space program. To oversee efforts "having obvious military objectives," he advised DoD establish "a central space laboratory with a very broad charter which would permit the conduct of the most basic sort of research as well as R and D."[85]

More provocative, however was his proposal to move the civilian side of space research, which until now had been held largely in the shadows of America's space activities, to the forefront of the nation's effort. "We must realize…," wrote Killian,

[83] Eisenhower, *Waging* Peace, 222; also cited in Divine, 39.

[84] Eisenhower, "Radio and Television Address," 7 November 1957, 796.

[85] James R., Killian, Jr. "Memorandum on Organizational Alternatives for Space Research and Development," 30 December 1957, in John M. Logsdon, ed., *Exploring the Unknown: Selected Documents*

"that there are extraordinary opportunities to extend our knowledge of the earth and its environment…. It may well be that these kinds of pure, non-practical research objectives may prove to be the most important and in the end the most practical." These, he argued, must be conducted out from under the auspices of the Defense Department. "One obvious way of doing this would be to encourage N.A.C.A. [the National Advisory Committee for Aeronautics] to extend its space research and to provide it the necessary funds to do so."[86] Both of Killian's recommendations—centralizing military space research within the DoD and making civilian research preeminent—meshed perfectly with Eisenhower's broader strategy to establish civilian control and weaken the military's ties to space. Within six months time, both would be implemented.

Eisenhower enacted Killian's proposals in early February 1958 at another key White House staff meeting. He and his staff agreed that the science advisor would chair a committee to outline the national space program and suggest an organization to guide it. In the interim, a centralized, civilian-led agency within the Defense Department would assume responsibility for the nation's space-related programs.[87] As the national organization became active, the defense agency would then relinquish appropriate programs to it and thereafter administer just those that remained within DoD's jurisdiction.

The Advanced Research Projects Agency (ARPA). Four days later, on 7 February and over the objection of all three services, Secretary of Defense McElroy centralized the

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in the History of the U.S. Space Program Vol. I: *Organizing for Exploration* (Washington D.C.: NASA History Office, 1995), 630.

[86] Killian, "Memorandum on Organizational Alternatives," 630.

[87] James R. Killian, Jr. *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology* (Cambridge: The MIT Press, 1977), 122.

Defense Department's space effort by signing DoD Directive 5105.15 to establish the Advanced Research Projects Agency (ARPA).[88] True to the administration's space for peaceful purposes intent, ARPA's name avoided any explicit connection between the military and space. To oversee the effort, McElroy appointed Roy W. Johnson as its director.

Roy Johnson set up ARPA as an oversight agency. He took control of all current and planned space-related programs, consolidated those being duplicated among the services, and redistributed individual projects back to the services on a contractual basis.[89] In essence, ARPA apportioned funds and effort but maintained managerial responsibility for the program. The agency thus fulfilled four objectives important to the administration: it eased interservice rivalry tensions; significantly curbed duplicate efforts; and gave military space programs a much higher priority within DoD.[90] But most importantly, ARPA put civilian leadership directly and firmly in control of the Defense Department's space program.

From the Air Force's perspective, it appeared to have lost its organizational stake in space right after publishing its "Air Force Astronautics Program," and General Putt had directed ARDC to look for ways to speed up putting a man into orbit. Instead of being the service responsible for space, the Air Force now feared that ARPA's establishment, given its unique fiscal powers, represented a major step toward a fourth military service. ARPA's director, however, had had a different perspective on his agency's role.

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[88] Piper, ix.

[89] Bowen, 26-7.

[90] Spires, 58.

Mr. Johnson was of the opinion, popular in some circles at the time, that the solution to the interservice rivalry problems besieging the Defense Department was to combine the three services into one. In his mind, creating a fourth was simply counterproductive.[91] Indeed, the Air Force's fears proved premature. On 28 February, the ARPA Director declared the Air Force had a "…long term development responsibility for manned space flight capability with a primary objective of accomplishing satellite flight as soon as technology permits."[92] Before year's end, ARPA would place 80 percent of its acquired programs back with the Air Force, while by comparison the Army would see only fourteen percent and the Navy six.[93] Moreover, ARPA's tenure as the controlling agent for the military's space program would cease by the summer of 1959, at which point, because of this generous reapportionment, the Air Force would find its stake in space *relative to the other services* in fact strengthened. The interservice comparison here, however, says nothing about the decline in absolute strength that the military space program experienced once the civilian organization still under consideration before Killian's committee came into being.

The National Aeronautics and Space Administration (NASA). Throughout February of 1958, Killian's committee worked to complete its plan for the nation's space program. During the process, they solicited all suitors for ideas. The Federation of American Scientists proposed that the Atomic Energy Commission head the national space effort. Senator Hubert Humphrey introduced a bill to create a new Department of

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[91] Futrell, 591. There was substantial debate within national security circles during this period surrounding the prospect of unifying the services into a single organization.

[92] Memo, R. W. Johnson, Dir, ARPA, to SAF, 28 February 1958, subj: Reconnaissance Satellites and Manned Space Exploration, as quoted in *Chronology of Early Air Force Man-In-Space Activity,* 18.

[93] Futrell, 591.

Science.[94] And despite their intent to generally decouple military connections from the program, Killian's team heard from these organizations too.

The Army lobbied aggressively for a leading role in the emerging plan. On the momentum of ABMA's successful launch of *Explorer I* on 31 January, Medaris and von Braun campaigned with what Killian remembers as "fierce religious zeal."[95] Their *Jupiter-C* rocket was clearly America's best available at the time. However, a basic question nagged the president's science advisor: "What roles and missions did the Army have in space?"[96]

The Air Force, behind its aerospace concept, fought equally as hard. Its argument in fact carried significant weight with Killian. He recalled, "The atmosphere and outer space were a continuum, it maintained with considerable logic," and, given the investments the Air Force had made, with its ballistic missile and satellite programs, theirs…

> …was an impressive case, but might have been stronger if the air force *[sic]* had suppressed some of its own special brand of fantasies about space. Its top-ranking officers freely predicted that the next war would unquestionably be fought with space weapons, and some of the smaller air force fry had visions of space wars and dropping bombs from satellites.[97]

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[94] Killian, *Memior*, 129.

[95] Killian, *Memior*, 127.

[96] Killian, *Memior*, 120.

[97] Killian, *Memior*, 128. Killian deals with the notion of "dropping bombs from satellites" quite flippantly here, but understandably so. The idea was in fact rather naive, which no doubt shined unfavorably upon Air Force leadership. On 26 March 1958, Killian's committee published a report, "Introduction to Outer Space," written expressly for public consumption. In it, the scientists explain the practical problems with such a concept. "A satellite cannot simply drop a bomb. An object released from a satellite doesn't fall. So there is no special advantage in being over the target. Indeed, the only way to 'drop' a bomb directly down from a satellite is to carry out aboard the satellite a rocket launching of the magnitude required for an intercontinental missile [an object traveling thousands of miles an hour forward must be slowed to a standstill before it will drop straight down]. A better scheme is to give the weapon to be launched from the satellite a small push [backwards], after which it will spiral in gradually. But this means launching it from a moving platform halfway around the world, with every disadvantage compared

The enthusiasm, cited earlier, of general officers such as Boushey and Putt had indeed left an impression. The science advisor would soon rein in the romantic visions of what he considered were these "otherwise rational commanders."

His memorandum to the President of 5 March stated that "the long term organization for the Federal [space program] should be under civilian control…. However," it conceded, "civilian control does not envisage taking out from military central projects relating to missiles, anti-missile defense, reconnaissance satellites, military communications, and other space technology relating to weapons systems or direct military requirements."[98] Killian's group then proposed that NACA, reconstituted with a much larger resource base and the clout of a director appointed by the president, would be the best organization to undertake the further development of America's space program.

As a respected, independent, and recognizably *civilian* research agency with a "long history of close and cordial cooperation with the military departments," NACA was ideally suited to the task. Given its broadened mission, NACA was to be renamed "the National Aeronautical and Space Agency to get away from the limited connotations of the term 'aeronautics' when used alone and to recognize that NACA has long since ceased to be an 'advisory committee.'"[99] These recommendations complemented Eisenhower's policy intentions perfectly. The president approved them and directed the Bureau of the Budget to draft the appropriate legislation.

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to a missile base on the ground. In short, the earth would appear to be, after all, the best weapons carrier." The full report is reprinted as Appendix 4 in Killian's memoir.

[98] Memorandum for the President, "Organization for Civil Space Programs," 5 March 1958, 280, as published in Killian, *Memoir*, Appendix 3.

[99] Memorandum for the President, "Organization for Civil Space Programs," 5 March 1958, 282-3, as published in Killian, *Memoir*, Appendix 3.

A month later, Eisenhower went before Congress personally to present the "National Aeronautics and Space Administration Act of 1958." His appearance not only emphasized the legislation's importance, but also provided the president an opportunity to further his vision for space. On 2 April, he told the nation's lawmakers:

> I recommend that aeronautical and space science activities sponsored by the United States be conducted under the direction of a civilian agency, except for those projects primarily associated with military requirements. I have reached this conclusion because space exploration holds promise of adding importantly to our knowledge of the earth, the solar system, and the universe, and because it is of great importance to have the fullest cooperation of the scientific community at home and abroad in moving forward in the fields of space science and technology. Moreover, *a civilian setting for the administration of space function will emphasize the concern of our Nation that outer space be devoted to peaceful and scientific purposes*.[100]

The National Aeronautics and Space Administration Act passed the House by unanimous consent on 2 June 1958,[101] it cleared similarly in the Senate two weeks later,[102] and Eisenhower, on 29 July, signed it into law. The relative ease of its passage reflected the influence of the Johnson Hearings. More specifically, the act established a dual-track civilian-military space program, and gave preeminence to the civilian effort by housing it within an agency independent of the Defense Department and under the direct control of the president. Indeed, a day prior to the bill's passage, Eisenhower underscored the implications of this organizational arrangement. Much to ARPA's surprise (and Air Force's dismay), the president assigned the newly authorized NASA its broad programmatic responsibilities.

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[100] Message from the President of the United States Relative to Space Science and Exploration, 2 April 1958, in U.S. House of Representatives, Select Committee on Astronautics and Space Exploration, *Astronautics and Space Exploration* (Hearings on H.R. 11881, 85th Cong., 2nd Sess., 1958): 3-4, as cited in Puckett, 45-46. Emphasis mine.

[101] *Congressional Record*, 85th Cong., 2d sess., 1958, 104, pt. 8:9941.

[102] *Congressional Record*, 85th Cong., 2d sess., 1958, 104, pt. 9:11306.

Three months earlier, ARPA, as the *pro tempore* national space agency, had organized America's space programs into four basic mission areas—I: Missile Defense Against ICBMs; II: Military Reconnaissance Satellites; III: Developments for Application to Space Technology (which included the lucrative responsibility of putting a man into space); and IV: Advanced Research for Scientific Purposes. Upon NASA's opening, it had been ARPA's intent to relinquish area IV programs to the new agency.[103] The Air Force, meanwhile, had been lobbying ARPA particularly hard for a lead role in the area III-designated manned space effort. Eisenhower, however, saw otherwise.

With his signature on Executive Order No. 10783, on 28 July the president turned over to NASA not only all of ARPA's projects from area IV, but also many from area III as well. The most significant implication of this order was that it gave NASA primary responsibility for manned spaceflight.[104] Overnight, AFBMD's "Man-In-Space-Soonest" project fell into NASA's hands. The new agency would soon rename the program "Project Gemini." The decision's effect on the Air Force's designs beyond the atmosphere would have far-reaching consequences.[105] So too would the influence of Eisenhower's soon-to-be-released national space policy.

NSC 5814/1. The need to codify a national policy for space arose from pressures at home and abroad. "Space for peaceful purposes" was the policy's cornerstone, but with little support or explanation during the months that followed *Sputnik*, the phrase had become vulnerable to critique and exploitation. At home, as the Johnson hearings

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[103] Bowen, 29.

[104] Bowen, 29.

[105] Ironically, the potential of MISS's short term capacity to orbit an astronaut resulted in AFBMD and the Air Force losing it to the new civilian agency. Dyna-Soar, on the other hand, at least a decade away from becoming an operational vehicle, and certainly less focused on exclusively space activities, remained under the Air Force's care.

foreshadowed, criticism grew within congressional leadership and military ranks over its apparent disregard or short shrifting of obvious national security considerations. *Sputnik*, in the minds of many, indicated that America's security had already been compromised significantly. To cede now the ultimate high ground with such a policy seemed capricious if not dangerous.

Abroad, the vagueness of "space for peaceful purposes" exposed the administration to a different problem. In January 1958, Eisenhower had initiated another series of diplomatic exchanges with the Soviets. Resuming a conversation begun the year before, the president proposed again that the superpowers "agree that outer space should be used only for peaceful purposes."[106] This time, however, the Soviets raised the ante by countering with a complete "ban on the use of cosmic space for [any] military purposes."[107] The Soviets equated "peaceful" with "non-military," which was, of course, untenable for Eisenhower because it would jeopardize, or at least make exceedingly difficult, America's sovereign right to defend itself. Diplomatic maneuvering ensued in the coming months that migrated quickly to the United Nations for resolution. In the interim, the administration realized that "space for peaceful purposes," among other elements of Eisenhower's space policy, needed significant clarification.

NSC 5814/1, "Preliminary U.S. Policy on Outer Space," emerged from the White House on 18 August 1958 to put to rest the ambiguities. The document represented

[106] "Letter From President Eisenhower to the Soviet Premier (Bulganin), January 12, 1958" in U. S. Department of State, Historical Office. *Documents on International Aspects of the Exploration and Use of Outer Space, 1954 – 1962* (Washington, D.C.: Government Printing Office, 1963), 52; also quoted in Futrell, 595.

[107] "Soviet Proposal on the Question of Banning the Use of Cosmic Space for Military Purposes, Elimination of Foreign Military Bases on the Territories of Other Countries, and International Cooperatioin in the Study of Cosmic Space, March 15, 1958" in State Department, *Documents on International Aspects of the Exploration and Use of Outer Space, 1954 – 1962*, 57; also referenced in Hays, 141; and McDougall, 179.

America's first expression of an overarching national strategy for space. Its opening sentence—"This statement of U.S. Policy on Outer Space is designated Preliminary because man's understanding of the full implications of outer space is only in its preliminary stages"[108]—revealed the policy's character and hinted at its scope.

Broadly, NSC 5814/1 recognized the Cold War dictated that

> …any use of outer space …whatever the purpose it is intended to serve, may have some degree of military or non-peaceful application. Therefore, U.S. policies relating to international arrangements on uses of outer space for peaceful purposes will have to take into account possible non-peaceful applications in determining the net advantage to U.S. security.[109]

Indeed, the policy even listed what the administration considered these "military uses" to be.[110]

More significant, however, was the broader theme that space offered the opportunity for man to extend "his horizons, add to his knowledge, [and] improve his way of life."[111] The document specifically addressed the numerous fields of science and technology that stood the chance to benefit from the prospect of space, it supported the immediate development of manned exploration, and it made a point to stress the value of pursuing these endeavors within a context of international cooperation.

> International cooperation agreements in which the United States participates could have the effect of (a) enhancing the position of the

[108] U.S. National Security Council, NSC 5814, "U.S. Policy on Outer Space," June 20, 1958, in John M. Logsdon, ed., *Exploring the Unknown: Selected Documents in the History of the U.S. Space Program* Vol. I: *Organizing for Exploration* (Washington D.C.: NASA History Office, 1995), 345. Note: NSC 5814/1 is reproduced in Logsdon only as the amended portion of the original document, hence the citation for this passage, and all others that follow is from NSC 5814, as reproduced in its original form.

[109] NSC 5814, in Logsdon, 347.

[110] NSC 5814, in Logsdon, 348. NSC 5814/1 listed eleven potential military uses of space: Ballistic Missiles, Anti-ICBMs, Military Reconnaissance, Satellites of Weather Observation, Military Communications Satellites, Satellites for Electronic Countermeasures (Jamming), Satellites as Aids for Navigation, Manned Maintenance and Resuppoly Outer Space Vehicles, Manned Defensive Outer Space Vehicles, Bombardment Satellites, and Manned Lunar Stations.

[111] NSC 5814, in Logsdon, 346.

> United States as a leader in advocating the uses of outer space for peaceful purposes and international cooperation in science, (b) conserving U.S. resources, (c) speeding up outer space achievements by the pooling of talents, (d) "opening up" the Soviet Bloc, and (e) introducing a degree of order and authority in the necessary international regulations governing certain outer space activities.[112]

Indeed, Eisenhower's policy was explicit in the primary political objective of the nation's space program: "World recognition of the United States as, at least, the equal of any other nation in over-all outer space activity and as the leading advocate of the peaceful exploitation of outer space."[113] Three months later, activity within the UN indicated that the U.S. was well on the way toward achieving that goal. But first, there is another discussion within NSC 5814/1 that modern historians have paid little if any attention to—perhaps because looking at it from today's perspective, its point was such an obvious one. In the summer of 1958, however, obvious it wasn't, and that in itself underscores its relevance to this study.

NSC 5814/1's introductory paragraphs noted the ambiguities associated with defining space and made a point to clarify the administration's position on the issue.

> Many names for the various regions of the earth's atmosphere and the divisions of space have developed over the years. The boundaries of these regions and divisions cannot be precisely defined in physical terms, and authorities differ widely on terminology and meaning…. Because the question of rights in "outer space" will undoubtedly arise at the U.N. General Assembly in September 1958,… it would appear desirable for the United States to develop a common understanding of the term "outer space." …For the purposes of this policy statement, space is divided into two regions: "air space" and "outer space."[114]

[112] NSC 5814, in Logsdon, 349.

[113] NSC 5814, in Logsdon, 353.

[114] NSC 5814, in Logsdon, 346-7.

The words officially codified the political course Eisenhower opted for in the days that immediate followed *Sputnik I's* launch.[115] In the summer of 1958, this was much less a statement of the obvious than it was the establishment of a strategic position. Space for peaceful purposes was a key element of Eisenhower's Cold War strategy. Remaining consistent with the position demanded that "outer space" be recognized and treated as a place separate and distinct from the atmosphere. In short, the division of air and space, in a very real sense, was a choice.

The Soviet and American positions on internationally sanctioned space controls came to a head before the world's governing body on 24 November 1958. Both nations had submitted rival plans to create an ad hoc UN committee to deal with the matter. Their opposing positions were similar in content to those expressed earlier in the year between the superpowers' respective leaders. With a General Assembly vote of 54-9-18, America's plan passed—the nine dissenting votes coming from the Soviet bloc—to create the Ad Hoc Committee on the Peaceful Uses of Outer Space (COPUOS). COPUOS would study space law and explore possibilities for international cooperation and information exchanges. As von Bencke noted, "This was a significant victory for the United States and presented the international impression of the U.S. as the leading proponent of space for peace and the benefit of all peoples."[116]

Thus, 1958 saw Eisenhower progress significantly toward his long-established goal of protecting space for free and peaceful purposes. The nation's space program was wrenched from military hands, placed firmly in civilian control, and fashioned as a

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[115] Interestingly, the words "freedom of space," a central idea in the policy position Eisenhower ascribed to with NSC 5520 three years earlier, and the principle that the Soviets established *fait accompli* with *Sputnik*, are conspicuously absent in NSC 5814/1.

[116] Von Bencke, 42.

program peaceful in character. Moreover, the administration had made it explicit that "space" was different from the atmosphere, and its use "for peaceful purposes" was acquiring momentum as a policy of choice within the international community. But to hold steadfast to such a policy, Eisenhower needed to know that it would not undermine American security. Since the summer of 1957, he had been gleaning confidence of this from a discreet perch that enabled him to monitor Soviet technological developments with his own two eyes.

SECURING OVERHEAD RECONNAISSANCE

Eisenhower's view into the Soviet hinterland opened in May 1957 when his ultra-secret U-2s began snapping pictures from high above the Siberian steppe. The potential of this new perspective was apparent from the beginning, but its value was affirmed the moment Khrushchev began waxing rhetorically about Soviet ICBM capabilities in the wake of *Sputnik's* ascent. At that point, Eisenhower could turn to mounting photographic evidence that revealed the Soviet Premier's bluff. Such information wielded tremendous power and its source became a valuable asset to protect. But the small few privy to the U-2s existence also knew of its precariousness.

The U-2 program's survival depended on its cloak of secrecy, which interestingly remained in place only through a tenuous mutual interest among enemies. Eisenhower's need to conceal the program was obvious; the U-2 overflights of the Soviet Union—each of which he authorized personally—constituted willful transgressions of Russian sovereignty. If exposed, the public uproar would be as predictable as the program's demise. The Soviets, on the other hand, found silence a welcome alternative to humiliation. To protest, or even acknowledge America's incursions—each of which they were painfully aware of—would only expose to the world their inability to prevent them.[117]

Both sides also understood, however, that this mutually convenient arrangement would dissolve the instant that Russian air defense systems became capable of stopping America's high-flying spy planes. Consequently, neither side doubted that "Aquatone's" days were numbered. But for Eisenhower, the development of an alternative source of overhead reconnaissance, preferably before the U-2's delicate cloak was removed, became crucial.

Just three weeks after *Sputnik I's* launch, a semi-annual report submitted to Eisenhower by his Board of Consultants on Foreign Intelligence Activities raised the stakes on the issue even more. Evaluating Soviet air defense projections against the country's most promising follow-on reconnaissance systems in development—the Air Force's WS-117L satellite program and a supersonic, high altitude aircraft being studied by the CIA[118]—the board found that the U-2's expected life-span fell short of the anticipated employment dates of these second-generation programs. In other words, America likely was facing an operational gap in its overhead reconnaissance capability. The board recommended a review of these advanced systems to see if "interim" programs might be extracted from them. Eisenhower responded immediately by directing both the

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[117] Kenneth E. Greer, "Corona," *Studies in Intelligence,* Supplement, 17 (Spring 1973): 4, (Declassified from Top Secret and reprinted in U.S. Central Intelligence Agency, Center for the Study of Intelligence, *Corona: America's First Satellite Program,* Kevin C. Ruffner, ed., official history, Washington, D.C., 1995, 3-39).

[118] The CIA program's name was OXCART and the aircraft in development was designated the A-12. Like the U-2, it too was a Kelly Johnson product, which would become known more commonly as the SR-71 Blackbird.

Air Force and the CIA on October 28 to provide him with a detailed update on the status of their advanced reconnaissance systems.[119]

Ten days later, Eisenhower appointed Killian as his science advisor, and along with the duties he had announced publicly, placed the nation's looming reconnaissance shortfall issue also squarely atop Killian's desk. For help, Killian turned to a proven and trusted colleague from his 1954 Technology Capabilities Panel effort, Edwin Land. Together, Killian and Land spent the next several weeks examining options and drafting a proposal.

The pair reported two key findings to Eisenhower. First, they recommended active pursuit of a reconnaissance satellite and agreed with the suggestion RAND had prepared for the Air Force in early November, which argued that segregating a portion of the WS-117L for independent development would accelerate its fielding. Their second finding, however, deviated from the RAND position. Killian and Land advocated removing the program from Air Force auspices, and, just like its U-2 predecessor, turning it over to the Air Force-supported but CIA-managed team of Bissel and Ritland.[120] The arrangement had already proven its effectiveness and the argument to continue it remained unchanged. As with the U-2, Killian and Land "wanted the new [satellite] program to focus on peacetime national intelligence objectives rather than reconnaissance after a nuclear exchange."[121]

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[119] Greer, 4-5; see also U.S. National Reconnaissance Office, *The National Reconnaissance Office, NRO: Its Origin, Creation, & Early Years,* by Gerald K. Haines, NRO Historian, (ND), 13; Burrows, 228; and Peebles, 12.

[120] *The NRO: Its Origin, Creation, & Early Years*, 13.

[121] Albert D. Wheelon, "Lifting the Veil on CORONA," *Space Policy* 11, no. 4 (November 1995): 251.

This marks the moment that Eisenhower first became keen on the potential of the reconnaissance satellite. On 24 January 1958, he signed NSC Action No. 1846, "Priorities for Ballistic Missiles and Satellite Programs," that gave the Air Force's WS-117L program equal standing along side the IC- and IRBMs for "the highest priority above all others for research and development and for achieving operational capability."[122] Twelve years after RAND's groundbreaking 1946 report heralding the potential of the "world-circling spaceship," the Air Force's reconnaissance satellite program had finally become a national developmental priority. But as he had with the U-2, only a month later Eisenhower took the program's most relevant portion out of the Air Force's hands and buried it deep, deep in secrecy.

On 28 February, without explanation and against much furor within the Air Force, ARPA suddenly announced "the cancellation" of about a third of AFBMD's national priority WS-117L program. Worse still, ARPA aimed its axe at the portion of the program which seemed to have the greatest potential for early success: the photographic subsystem.[123] A chosen few of the personnel affected by the decision were at this point pulled quietly aside and informed not to terminate their work, but rather to continue it in support of a top secret project of a different name under the direction of an entirely different agency.

Resurrected as "CORONA," Bissel and Ritland assembled their new team to reprogram the satellite project, this time without regard for fiscal constraint. On 16 April, just two weeks after the president proposed the creation of NASA, a plan for America's

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[122] NSC Action No. 1846, "Priorities for Ballistic Missiles and Satellite Programs," as cited in R. Cargill Hall, "The Eisenhower Administration and the Cold War: Framing American Astronautics to Serve National Security," *Prologue: Quarterly of the National Archives* 27, no. 1 (Spring 1995): 65.

[123] Greer, 6.

first reconnaissance satellite quietly crossed Eisenhower's desk for review. CORONA would be administered very much as the U-2 had been, the only organizational difference being that the CIA would share the program's responsibility equally with ARPA. The Air Force's role, however, would remain unchanged. Airmen would help build, maintain, and operate the vehicles, but they would not control them. The initial satellite's design would consist of an optical camera system that would eject its film canisters from orbit for recovery over the ocean with specially outfitted C-130 Hercules aircraft. Bissel projected an operational date as early as June 1959. Lore has it that Eisenhower approved the proposal with "a handwritten note on the back of an envelope."[124]

As for WS-117L's fate, ARPA divided what remained into two systems, both of which were then contracted back to AFBMD. "Sentry" (later designated "Samos") became an advanced reconnaissance satellite project slated to develop electro-optical cameras capable of sending data link images back to earth. "Midas," on the other hand, developed as an infrared sensing satellite to detect and monitor enemy missile activity.[125]

Meanwhile, on 3 December 1958, the Air Force announced a new satellite program, "Discoverer," that would be completely disassociated from the Air Force's military reconnaissance efforts. "Discoverer" was supposedly dedicated to preparing for future manned space flight by studying how environmental conditions in space affected biomedical specimens.[126] But in reality, the 37 satellites launched under its aegis during the coming nine years carried some of the world's most sophisticated camera equipment available. "Discoverer" was the official cover story for CORONA.

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[124] Greer, 8,9.

[125] Bowen, 30.

[126] Greer, 11.

In the search for answers to this study's basic research questions—Why does the aerospace concept still persist within the Air Force, but yet fail to stick?—the year that followed *Sputnik* offers a wealth of information. The events that unfolded, both within and outside of the Air Force, not only had an immediate and important effect on the aerospace concept's staying power, but portended implications and repercussions for the rest of this study.

Within the Air Force, the post-*Sputnik* environment saw the rejuvenation of earlier themes as well as the emergence of new ones. As before, but clearly invigorated by the Soviet space shot, the service continued mobilizing resources toward the development of systems that would enable it to extend its operational capability beyond the atmosphere. Similarly, R&D-related organizational structure continued to evolve around these systems to better facilitate this development. More importantly, however, *Sputnik* impelled Air Force leadership to focus much more sharply on the service's space-bound aspirations. Out of this attention, the aerospace concept at last emerged in an explicit form, anchored to the service's air power theory, and serving as primary justification for the Air Force's interest to extend its reach beyond the atmosphere. Certainly, while some activities within the Air Force during 1958 discouraged the aerospace concept's institutionalization—e.g., the space-centric sub-culture that began emerging at AFBMD—the year proved unquestionably fruitful where the idea's further penetration into the service is concerned.

At the same time, however, outside the Air Force, an alternative wind had begun to blow. Eisenhower, holding true to a broader policy theme established at the outset of his presidency, leveraged the Soviet ascent into space and channeled it toward securing his own legacy there. He made the Soviets unintentional collaborators in establishing the precedent for "freedom of space." Resisting the call from Capitol Hill for a more active response, the president instead forged the consensus opinion for greater civilian control over the nation's space program down a path of restraint. With the creation of NASA and the programs he put under its charge, Eisenhower deliberately and significantly diluted the military's role therein. Moreover, these moves fashioned a credible face on his policy of "space for peaceful purposes," which, by year's end, he had ushered into national prominence and had laid it before the international community to embrace.

Sputnik also provided America's general-turned-statesman critical diplomatic maneuvering room through which he would be able to place a follow-on generation of overhead reconnaissance assets quietly in orbit. The endeavor would prove crucial in securing his policy goals, for Eisenhower's eyes aloft would become a consistent source of assurance that his policy of peaceful space could be pursued confidently and *not* at the expense of American security.

Importantly, everything that Eisenhower accomplished in *Sputnik's* wake hinged fundamentally on the notion that space was a different and separate place from the atmosphere. More importantly still, he was as explicit in his choice to recognize this distinction as the Air Force was in its choice not to. Hence, the year that followed *Sputnik* saw the public convergence of two ideational currents that had heretofore meandered each quietly unencumbered by the other. Although by the close of 1958, the Air Force found itself a clear front-runner in the DoD's space program, "space for peaceful purposes" had emerged as a looming collar for the service's exo-atmospheric ambitions, fundamentally negating its aerospace concept—the very premise upon which these ambitions rested.

Chapter 6

A Concept Challenged
(Objectification, 1959-60)

First impressions are lasting impressions. 1959 and 1960 mark a two-year period during which many within and outside of the Air Force for the first time are exposed to and have the opportunity to consider the aerospace concept. Air Force leadership launched the idea publicly in early 1959 and followed up with a deliberate and extended information campaign to support it. Consequently, the aerospace concept—encapsulated now within a one-word vessel—proliferated well beyond the limited organizational confines it had inhabited until this point. But explicit, on the table, and rapidly diffusing throughout the Air Force as it was, the notion that air and space are one also became subject, for the first time in its history, to the marketplace of ideas.

Markets challenge and markets correct. When Air Force leaders touted aerospace, resource competitors heard "no one else's space." When they justified aerospace, Defense Department leadership heard "war from space" and thus, contrary to the administration's space designs. Indeed, even within the Air Force, evidence of pushback to the idea surfaced. In short, during 1959 and 1960 the aerospace concept burrowed more deeply into the Air Force's ideational landscape, but faced some resistance as it did.

In terms of the institutionalization process, these signs were fully consistent with the concept progressing further into the objectification phase. Within the Air Force, stronger consensus grew around the idea as it reached more deeply into and more broadly throughout the organization. As Eisenhower's presidency ended, however, a key area of the organization showed resistance to embracing the idea. Moreover, this counter perspective drew tacit support from an environmental context that had further entrenched the political and organizational division of air and space. The details of how and why these events unfurled are important to understanding the aerospace concept's long-term institutional viability within the air arm.

This chapter reviews these details in two sections. The first commands the lion's share of the chapter's attention. It explores aerospace-related activity that occurred within the Air Force in 1959 and 1960. The second section examines contextual events that occurred beyond the Air Force's purview but that influenced the concept's proclivity toward institutionalization nonetheless. Specifically, it describes a final set of actions, both public and secret, that Eisenhower took to shore up his space legacy.

THE AIR FORCE SECURES ITS AEROSPACE CONCEPT

Within the Air Force, the aerospace concept made enormous inroads during the last two years of the Eisenhower presidency. The variables behind this progress toward institutionalization were the intensive focus of Air Force leadership in the form of a deliberate information campaign, and more explicit and sophisticated theorizing in support of the idea. At the same time, however, as during 1958, organizational structure and resource developments lagged the ideational growth, and in some respects became counterproductive to it. In short, an organizational tension mildly apparent at the end of

1958 between what the Air Force was saying and what it was doing, had tightened considerably over the two years that followed.

To capture these issues, this section's discussion begins with an in-depth look at the activities and arguments of Air Force leadership in the effort to push the aerospace concept further into the Air Force. Next, it details the organizational restructuring that occurred within Air Force agencies responsible for the service's emerging aerospace capacity. Finally, the section examines the progress of the particular systems that could enable aerospace. In many respects, the developments that occur within the Air Force during these two years established the foundation for how the aerospace concept exists within the service even today. In that respect alone, this constitutes an important period.

PROJECTING AND PROMOTING THE IDEA

Issues that draw the attention of an organization's senior leaders say a great deal about the course an organization takes. In early 1959, Air Force leaders focused significant attention on a deliberate information campaign to drive the aerospace concept deeply into the Air Force. With the coining of the word just months before, in "aerospace" they now had an easily-propagated mechanism through which to articulate and justify the service's future course while remaining connected with its past. Moreover, because the aerospace concept was valuable in helping the Air Force sustain its argument for a lead role in the nation's still-burgeoning space program, this campaign had a secondary effect as well. Besides moving the idea further into the service, Air Force leaders also spread the idea to the broader audience outside of it.

Aerospace Goes Public. The campaign's opening volley was General White's journal article, discussed in the last chapter, which suggested, "We are and have been operating in the 'Aerospace Age.' Its first significant engagement, however, occurred on Capitol Hill in early February 1959, when the newly established House Committee on Science and Astronautics called various agencies and experts to its opening hearings to establish a "picture of the situation as it exists today in the fields of science and astronautics." Given this was "the first such addition to standing committees of the Congress since 1892," the hearings attracted considerable attention and the Air Force, invited to testify early on the proceeding, seized on the opportunity.[127] Because this event's unfolding illuminates the three key challenges that Air Force leaders faced in the coming few years as they tried to institutionalize the aerospace concept, it is worth a moment to examine the hearings more closely.

General White put a team of his best representatives together and then led off the service's testimony with an opening statement designed in part to introduce the word and concept of "aerospace" to those who controlled the resources that would enable it. After casually mentioning the term twice within the first minute of his prepared text, White paused to explain.

> Aerospace is a term which may be unfamiliar to some of you. Since you will hear it several times during the course of our presentations, I would like to define it for the committee at this time. The Air Force has operated throughout its relatively short history in the sensible atmosphere of the earth. Recent developments have allowed us to extend our operations further away from the earth, approaching the environment *popularly referred to as* space. Since there is no dividing line, no natural barrier separating these two areas, there can be no operational boundary between them. Thus, air and space comprise a single continuous operational field in which the Air Force must continue to function. This area is aerospace.[128]

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[127] Congress, House, Committee on Science and Astronautics, *Missile Development and Space Sciences: Hearings before the Committee on Science and Astronautics,* 86th Cong., 1st sess., February 2,3,4,5,9,10,17,18,24, March 2, and 12, 1959, 1-2.

[128] House Committee, *Missile Development and Space Sciences*, 74. Emphasis mine.

He leveraged the term repeatedly thereafter to help express some of his broader themes: "Soviet aerospace power" was the major military threat facing America; "U.S. aerospace power" was the nation's primary deterrent to contain it; "total aerospace power includes manned and unmanned air-breathing vehicles, spacecraft, and satellites and ballistic missiles;" and "[t]he decisive weapons of the future will be aerospace weapons."[129] White's intended message to lawmakers that day was clear—the Air Force was a natural choice to lead the nation's military expansion into space; national security demanded it; aerospace made it so. The Air Force chief, however, clearly underestimated the immediate stir this new word would generate.

First, White had taken some of his own flock by surprise. Air Force briefers from the Pentagon had all fallen in lockstep behind General White's "aerospace" lead. However, Lieutenant General Samuel E. Anderson and Major General Schriever, the commanders of the Air Research and Development Command (ARDC) and the Air Force Ballistic Missile Division (AFBMD) respectively, were also part of the Air Force team assembled for Capitol Hill. And rather noticeably, both failed to make any mention of the word in their testimony.

Queried directly about the omission by the committee's chair, Congressmen Overton Brooks, Anderson explained: "That is a new word to me, too, Mr. Chairman."[130] Schriever, asked later in the afternoon just how far out he thought this new aerospace area extended, replied:

> I think I can best answer by saying that space from our point of view is another medium and when I say 'space' in the immediate future I am talking primarily as to several hundred or several thousands of miles from

[129] House Committee, *Missile Development and Space Sciences*, 74-5.

[130] House Committee, *Missile Development and Space Sciences*, 90.

> the earth. It is another medium in which we can develop vehicles and systems which can do our mission better, just as land, sea, and air are mediums.[131]

White must have cringed. These were hardly aerospace-supporting scripts. As well, they exposed subtle issues White faced within his own organization. Anderson's response made clear the internal information campaign that was still needed, while Schriever's revealed hints of the ambivalence, or perhaps even reticence that this campaign might face.

Outside of the Air Force, the turbulence generated in the concept's debut was even more conspicuous. Consider, for example, committee majority leader Congressman John W. McCormack's reaction directly following General White's opening remarks.

> I appreciate that [the word "aerospace"] was coined by the Air Force. I imagine within *that space* that any of these conflicts between the Air Force and the Army and the Navy in outer space would be very easily adjusted from the Air Force angle because everything would come under "Aerospace." …I can see where it developed, however. We will see what the future holds as to the term "aerospace" and the claim for its jurisdiction.[132]

Indeed, *The New York Times*, reporting on the hearings the following morning, honed in on this exchange in particular. Appearing on page three, "Atmosphere and Space Joined as 'Aerospace'" was the article's title, but "aerospace met with skepticism" was its theme. The piece summarized McCormack's reaction above and then closed by quoting his question (and White's answer) that came on its heels. "'Why not call it spaceaero, anyhow?' [McCormack] asked. 'It's a little more euphonic this way,' General White replied."[133]

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[131] House Committee, *Missile Development and Space Sciences*, 109.

[132] House Committee, *Missile Development and Space Sciences*, 77. Emphasis mine.

[133] "Atmosphere and Space Joined as 'Aerospace,'" *New York Times,* 4 February 1959, 3.

Lastly, the other two services testifying before the Science and Astronautics Committee also took aim at the Air Force's "new" concept. Take for example the response of Army Major General Dwight E. Beach, the director of air defense and ballistic missiles on the Army staff, when asked for his thoughts on aerospace.

> Well, I never heard of that term before. I always heard of "armospace."…I don't believe any one service should have overall responsibility. It should be a national effort. …the Army has specific requirements in space, and our position is that no single military department should be assigned sole responsibility for military space operations.[134]

The Navy's stance was similar. They argued that rather than advancing into space by way of the Air Force vision, the most effective route was to replace the current NASA/ARPA arrangement with a single U.S. space agency analogous to the Atomic Energy Commission structure.[135]

In short, the aerospace concept's public debut under its newly acquired aegis had met considerable friction. The words of Congressman Daniel J. Flood, spoken during an entirely different set of hearings later that week, captured the gist and extent of its first impression: "Boys, the Air Force has come up with a new phrase, 'aerospace.' That is a beauty. …That means everybody is out of space and the air except the Air Force, in case you don't know it. …They have now staked out a claim to 'aerospace.'"[136] It was quickly apparent that beyond the Air Force, when confronted with "aerospace" for the

[134] House Committee, *Missile Development and Space Sciences*, 247.

[135] House Committee, *Missile Development and Space Sciences*, 154,171.

[136] Congress, House, Committee on Appropriations, *Department of Defense Appropriations for 1960: Hearings before the Subcommittee of the Committee on Appropriations,* 86th Cong., 1st sess., Part 1, Policy Statements (Washington, D.C.: US GPO, 1959), 579. Also cited in Robert Frank Futrell, *Ideas, Concepts, and Doctrine,* Vol. 1, *Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base, AL: Air University Press, December, 1989), 554.

first time, many were hearing it as a cheap and simple euphemism for "Air Force land grab."

Thus, within a few days of General White's testimony, key challenges still facing the aerospace concept's advocates had plainly emerged. First and most importantly, there was work ahead within the Air Force's walls to further inform and educate its own. Second, there was the aerospace concept's reiteration to Congress and the public to build broader support. Finally, there was foreshadowing of a fight still ahead with the services on how to organize the military's space effort. Where the institutionalization process is concerned, these were all issues consistent with those that a developing institution faces during the early to mid period of the objectification phase. Air Force leadership would focus and act upon them over the coming two years.

Instilling Aerospace Within. Service leaders employed three vehicles over the next two years to push the aerospace concept deeper into and throughout their own organization. One, "Air Force Information Policy Letters," was aimed at commanders Air Force-wide. A second, the service's professional journal, targeted its officer corps in general. And the third, its basic doctrine, reached out to Air Force personnel writ large.

The "Information Policy Letters" were a product of the Office of the Secretary of the Air Force.[137] Published monthly and distributed to commanders throughout the Air Force, they highlighted the service's key issues and official policy positions that "should be kept foremost in mind by commanders in their communications with Air Force

[137] More specifically, they originated from the office's Director of Information (at the time) Major General Arno H. Leuhman.

members and with the public."[138] As such, the letters were an obvious conduit through which Air Force senior leadership could push its "aerospace" message downward into the organization.

From June 1959 through February 1960, every single issue of the "Information Policy Letter" addressed the aerospace concept in some way or another. June's issue listed it explicitly as the first of the Air Force's seven basic policy principles.[139] September's reiterated to the service's commanders that the Air Force was pursuing manned-space systems because "our future offensive and defensive mission, as we reach farther out in aerospace, will be analogous in principle to those missions we now conduct at lower altitudes."[140] December's reminded Air Force commanders that the "Air Force slogan… 'U.S. Air Force—Aerospace Power for Peace' should be used wherever appropriate to keep Air Force members and the general public aware of the Air Force's primary area of responsibility in the Nation's land-sea-aerospace military team."[141] For nine continuous months, these letters served Air Force commanders across the organization a steady diet of what was arguably the service's highest priority policy theme of the time. The most significant letter of this group by far, however, was the one circulated in January 1960.

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[138] Department of the Air Force, Director of Information Services, Office of the Secretary of the Air Force, *Air Force Information Services Letter: Information Policy for Commanders* XIII, no. 1, 15 June 1959, 2. (Hereafter *AFIPC*).

[139] Department of the Air Force, *AFIPC* XIII, no. 1, 3.

[140] Department of the Air Force, Director of Information Services, Office of the Secretary of the Air Force, *Air Force Information Policy Letter* XIII, no. 5, 1 September 1959, 1. (Hereafter *AFIPL*).

[141] Department of the Air Force, *AFIPL* XIII, no. 8, 1 December 1959, 3. Slogan also cited in Benjamin S. Lambeth, *Mastering the Ultimate High Ground: Next Steps in the Military Uses of Space* (Santa Monica, CA: RAND, 2003), 42, and Frank W. Jennings, "Doctrinal Conflict over the Word *Aerospace*," *Airpower Journal* IV, no. 3 (Fall 1990): 58, see footnote 41.

Timed to coincide with the release of the Air Force's long-awaited revision to its basic doctrine manual (more on that shortly), January's missive devoted two and a half of its four pages to the aerospace theme. Not only did it give commanders specific guidance on how to use the term, it also provided them a rationale behind why they should. "Say 'aerospace power,' not 'airpower,'" the letter urged.

> Science and technology have made the U.S. Air Force an aerospace force. The Air Force is making itself a blend of aircraft, missiles, and spacecraft. It is engaged in building aerospace power for peace. …Airpower has become aerospace power. When speaking or writing of the present of future Air Force in terms of power, say "aerospace power." …Generally, avoid [the] term "outer space.
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> …The Air Force bases its selection of weapon systems on the functions for which it must provide forces. It tailors its weapons to the mission to be performed. Its [Title 10] assigned mission is to provide forces "to gain and maintain general air supremacy," and that can be done only with offensive and defensive aerospace systems used at whatever altitude required—whether at 50,000 feet or 50,000 miles.[142]

In other words, the Air Force's mission and responsibilities, as written in law, were not elements bound by, nor even related to physical properties of the atmosphere. This was a position inherently consistent with air power theory's most basic premise as well: control the vertical, control the ground below. And as technology extended the limits of verticalness, so too extended the domain which airmen were charged to control.

While senior Air Force leaders were pushing their concept down through the service's commanders, they were making similar (if less frequent) aerospace-encouraging arguments within the service's professional journal. Here, though, their target audience was the Air Force's broader officer corps.

General White led this charge by writing annually in the *Air University Quarterly Review (AUQR)* to build support for the concept. As discussed earlier, his December

1958 article introduced the word describing the air and space continuum. In the fall of 1959, he published an essay titled "Nuclear Propulsion and Aerospace Power," where he rested his vision of the potential of this emergent power plant technology explicitly on an "aerospace" foundation. White used the concept repeatedly throughout his essay to argue that as nuclear rockets enable high-payload "operations further out in aerospace… air power evolves into aerospace power."[143]

The Air Force chief of staff wrote a third *AUQR* article in the waning days of Eisenhower's presidency. This time General White took his aerospace theme beyond simply describing or advocating to Air Force's single medium. By January 1961, he was urging to his officers to develop and maintain an aerospace frame of mind.

> The term "aerospace" portrays the true nature of the medium which is the operational environment of the Air Force today. …The idea of complete continuity in the word aerospace is extremely important in all phases of Air Force operations. *Aerospace must be recognized in its entirety when analyzing our concepts, when examining the performance capabilities of our weapons, and when determining the structure and disposition of our forces.*[144]

White's organizational vision had matured beyond seeing an Air Force that simply embraced the aerospace concept. Here he envisioned an Air Force that embodied it, that accepted the concept as fact and would act in a manner consistent with it. In other words, White was projecting an Air Force that had fully institutionalized the aerospace idea. The organization had yet to reach this point, but he was intent on moving it in that

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[142] Department of the Air Force, *AFIPL* XIV, no. 1. 1 January 1960, 1, 2.

[143] Thomas D. White, Gen, chief of staff, US Air Force, "Nuclear Propulsion and Aerospace Power," *Air University Quarterly Review* XI, nos. 3 and 4 (Fall and Winter 1959): 4, 5.

[144] Thomas D. White, Gen, chief of staff, U.S. Air Force, "The Aerospace and Military Operations," *Air University Quarterly Review* XII, nos. 3 and 4 (Winter and Spring 1960-61): 4. Emphasis mine.

direction, and his effort was gaining momentum. White's article opened a 298-page double issue of *AUQR* devoted entirely to supporting his cause.

"Aerospace Force in the Sixties" was its theme, fifteen of its twenty-six articles had the word "aerospace" in their titles, and nearly all of them spoke directly to and about the concept within the articles themselves. More importantly, the list of authors who wrote them described a pantheon of senior leaders from operational, support, and R&D organizations throughout the Air Force.[145] A review of these articles shows that many of these authors had not yet internalized the concept to the extent that White had. However, the journal nevertheless offers proof that by the close of Eisenhower's presidency in January 1961, Air Force leaders across the service were actively engaging to push the aerospace concept further into the mainstream of every-day Air Force organizational thinking. Beyond these articles, or even the policy letters to the service's commanders, however, the most influential and enduring vehicle Air Force leaders used to promote the aerospace concept was the service's basic doctrine manual, which had been under revision since April 1958.[146]

Doctrinal Debut. Signed and approved for publication by General White on 1 December 1959, a new Air Force Manual (AFM) 1-2, *United States Air Force Basic Doctrine* began permeating the organization in early 1960. The Air Force distributed a copy of this manual to "each Air Force officer on active duty."[147] Key noncommissioned

[145] Interestingly, this particular *AUQR* edition was not circulated until mid-October 1961. Security concerns from Kennedy administration defense officials over some of the more sensitive satellite-related articles held up its publication until the fall.

[146] See Smart memo discussion in Chapter 5, p. 163.

[147] Department of the Air Force, Air Force Manual (AFM) 1-2, *United States Air Force Basic Doctrine,* December 1959, i.

officers and civilians within the service received copies as well.[148] Thus, its diffusion was both broad and deep—a significant fact considering the organizational message this publication carried within it.

Short of a few added paragraphs, and a broadened definition of war, the Air Force's new version of its basic doctrine was new largely because it codified and employed the aerospace concept. The manual defined the idea up front.

> The aerospace environment is an operationally indivisible medium consisting of the total expanse beyond the earth's surface. The forces of the Air Force comprise a family of operating systems—air systems, ballistic missiles, and space vehicle systems. These are the fundamental aerospace forces of the nation.[149]

Thereafter, aerospace was used ubiquitously throughout the remainder of the text, but without altering the basic content or meaning of its April 1955 predecessor. Essentially, the new AFM 1-2 largely just substituted *aerospace* wherever the word *air* appeared in the earlier version.

Indeed, this has been an issue that historians of air force doctrine have criticized at times ever since.[150] The air staff had initiated the doctrinal revision to capture the vast changes air power had seen since the mid-1950s. But in the end, the updated basic manual reflected much more of a simple facelift over its predecessor than any sweeping change. Such retrospect however, generally fails to illuminate that at the time and from the perspective of those who were championing the aerospace concept, this was precisely their point.

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[148] Department of the Air Force, *AFIPL* XIV, no. 2, 1 February 1960, 3.

[149] AFM 1-2, December 1959, 6.

[150] See Futrell, *Ideas, Concepts, and Doctrine,* Vol. 1, 10, and Vol. 2, 713; Johnny R. Jones, Lt Col, *Development of Air Force Basic Doctrine* (Maxwell AFB, AL: Air University Press, April 1997), 8-9; or more recently Lambeth, 39-47.

From the outset, when General White spoke of aerospace, he spoke of nothing more than an extension of the status quo. "Air Force goals," he wrote the year prior, "have changed in degree only; the basics have been constant—greater speed, longer range, and higher altitude."[151] When pushing the new doctrine manual a year later, his message was the same: "The predominant characteristics of air forces (now aerospace forces) have changed only in degree. Range, mobility, flexibility, speed, penetrative capability and firepower delivery—the characteristics that combine to make aerospace forces unique among military forces."[152] Indeed, envisioning the aerospace concept in this regard was entirely consistent under the rubric of air power theory.

The intellectual foundation, upon which the Air Force was built, posits that in warfare, control of the sky enables freedom to impose military force unchallenged from above, to destroy an enemy's capacity and will to fight, and hence, to control a war's outcome. Under such a construct, the aerospace concept was (and is) axiomatic. "Above" necessarily implies no limit. By the theory's internal logic, to control the atmosphere but not the space above the atmosphere is then not to control the surface below. In this sense, within this paradigm of thought, "aerospace" assumes an *a priori* character. Thus, from a theoretical perspective, the technologies emerging in the late 1950s that could enable operations above the reaches of the atmosphere did not change air power's essence; they merely extended its reach. Indeed, the physical characteristics of the environment—the air within the atmosphere, or the vacuum of space—had nothing to do with the nature of the power that controlling this environment provided. And

[151] Thomas D. White, Gen, chief of staff, U.S. Air Force, "The Inevitable Climb to Space," *Air University Quarterly Review* X, no. 4 (Winter 1958-1959): 4.

interestingly, airmen both perceived and articulated this perspective of their medium in their doctrine years before "aerospace" became a word.

The Air Force published its first volume of AFM 1-2 in March 1953. Moreover, those charged with creating this document had completed their final draft by 7 March the year prior—a full year was needed thereafter to coordinate it and get it approved.[153] As this study described early within chapter 4, during this period the Air Force's missile and satellite programs barely existed on paper. In other words, the earliest aerospace-enabling technologies were far removed from the daily thoughts, conversations, and activities of mainstream Air Force personnel, who at the time were shoring up Cold War defenses in Europe or fighting the limitations of a limited conflict in Korea. Thus, the authors of the Air Force's earliest basic doctrine manual were likely neither focused upon nor even considering the expanse beyond the atmosphere in their writing effort. With this thought in mind, note how the first issue of AFM 1-2—again, published in March 1953—described the service's "Medium of Operation:"

> The nature of the *medium of space* gives to air forces a versatility not common to surface forces. The limitations imposed by the definitive boundaries of both sea and the land restrict the employment of surface forces, while air forces are free to engage or support land, sea, and other air forces. The medium of space allows air forces maximum opportunities for dispersal, concentration, and freedom of maneuver, and permits unparalleled observation of any point on the earth's surface. *The most significant quality of this medium is the fact that it exposes to assault by the air vehicle the entire structure of a nation….*[154]

[152] Department of State, "Memorandum of a Conference, President's Office, White House, Washington, October 8, 1957, 8:30 a.m," in *Foreign Relations of the United States, 1955-1957* Vol. XI: *United Nations and General International Matters,* ed. Lisle A. Rose, 755-756), 3.

[153] Futrell, *Ideas, Concepts, and Doctrine,* Vol. 1, 389.

[154] Department of the Air Force, Air Force Manual (AFM) 1-2, *United States Air Force Basic Doctrine,* March 1953, 7. Emphasis mine.

This description is not an example of airmen looking forward to a time in the future when they would be operating beyond the atmosphere exclusively. Nor is it an example of airmen defining their operational domain in terms of its physical substance. Rather, this shows that from the outset, with regard to its perceived qualities and advantages, the Air Force envisioned its medium *spatially*.

Two years later, AFM 1-2 underwent its first major revision. In structure, the specific description of the operating medium highlighted above was deleted. However, the spatial perspective on its domain remained apparent throughout. For example, in a discussion on the fundamental characteristics of military forces in general, the 1955 revision of the Air Force's basic doctrine explicitly identifies the three mediums in which these forces can operate: "land, sea, or air."[155] However, shortly thereafter, in discussing the characteristics of air forces specifically, the language and perspective of the first edition were carried over:

> Operating in the medium of space, unrestricted by the definitive boundaries of land or sea, air forces are inherently capable of operating anywhere at any time…. *The medium in which air forces operate—space—is an indivisible field of activity.* This medium, in combination with the characteristics of air vehicles, invests air forces with the great flexibility that is the basis of their strength. For this flexibility to be exploited fully, the air forces must be responsive at all levels of operation to employment as a single aggregate instrument.[156]

Note as well the phrase "indivisible field of activity" herein—published in basic doctrine to describe the Air Force's medium a full two and a half years before General White told the National Press Club that "air and space are an indivisible field of operations" in *Sputnik's* aftermath.

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[155] Department of the Air Force, Air Force Manual (AFM) 1-2, *United States Air Force Basic Doctrine,* 1 April 1955, 2.

[156] AFM 1-2, 1 April 1955, 4. Emphasis mine.

Aerospace was not a new concept in 1959; it was simply a new word. Nor was aerospace intended to allude to the physical characteristics of the medium. It was a term meant to capture in a single phrase what airmen had long perceived about their domain, and meant to embrace the expansion of that domain as emerging technologies of the time seemed to be enabling. Thus, when Air Force leadership circulated its Information Policy Letters, its professional journals, and its revised doctrine throughout the service during the last two years of Eisenhower's presidency, the aerospace messages they carried within them landed on rather fertile ground. The term and its meaning was not a radical alteration of the prior view that airmen generally held of their world. It was more of an adjustment, generated by the expanding horizons that technology was enabling. Aerospace, however, did challenge the commonly held perspectives of those outside the Air Force.

Spreading Aerospace Without. Beyond the Air Force's organizational boundaries, the view that air and space form a single indivisible medium did not permeate an intellectual terrain well groomed for the idea. As the previous chapter explained, the international security environment, or more accurately, the Eisenhower administration's chosen responses to that environment, were intentionally driving a wall between air and space. Moreover, the organizations in competition against the Air Force for limited Defense Department resources found it in their best interests, naturally, to support and perpetuate that divide. Thus, Air Force leadership, while not intent on institutionalizing their aerospace concept among the broader national security community per se, did remain focused on securing and protecting the Air Force's interests in military space development. Because they used the aerospace concept repeatedly and forcefully in this effort, the idea garnered a tremendous amount of additional exposure, most of which also indirectly promoted further institutionalization of the concept within the Air Force.

Following the hearings in February 1959, aerospace became a recurring theme used by the Air Force's uniformed and civilian leaders in further Air Force congressional testimony as well as in other public appearances. During Senate committee hearings in April, Under Secretary of the Air Force Malcolm A. MacIntyre reiterated the increasingly common argument.

> We did not adopt this term as a "catchword," but rather to identify, in a single word, the continuous operational field in which the Air Force must function as technological progress permits us to operate farther and farther away from the earth's surface. …Just as our armies operate on the plains and in the mountains, and our navies operate on and under the seas, so must the Air Force operate in the earth's atmosphere and the space above it, that operational area we call aerospace.[157]

During the summer, White employed the concept again in testimony before the Joint Committee on Atomic Energy.[158] Indeed as 1959 wore on, the Air Force crafted an informal policy position whose basic substance appeared "continually in testimony before congressional committees in the early months of 1960."[159]

This policy had three basic tenets. The first captured the concept itself, namely, that the "total expanse beyond Earth's surface constituted one vast operating arena—aerospace." The second held that the Air Force mission "could be fulfilled without

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[157] Congress, Senate, Committee on Aeronautical and Space Sciences, *Investigation of Governmental Organization for Space Activities: Hearings before the Subcommittee on Governmental Organization for Space Activities of the Committee on Aeronautical and Space Sciences,* 86th Cong., 1st sess., March 24, 26, and April 14, 15, 22, 23, 24, 29, and May 7, 1959, 353.

[158] Congress, Joint Committee on Atomic Energy, *Aircraft Nuclear Propulsion Program: Hearing before the Subcommittee on Research and Development,* 86th Cong., 1st sess., 23 July 1959, 40-4.

[159] Max Rosenberg, *The Air Force in Space: 1959 – 1960,* K168.017, 1959 – 1960, IRIS No. 472256, in USAF Collection, Air Force Historical Research Agency, Maxwell AFB, AL (hereafter USAF AFHRA), 12. See also Spires, David N. *Beyond Horizons: A Half Century of Air Force Space Leadership.* Peterson AFB, CO: Air Force Space Command, Spring 1995, 83.

regard to whether a weapon system was aeronautical, astronautical, or a combination of both. The prime criterion in the selection of a system to satisfy a military requirement should be its effectiveness." The third tenet aligned the Air Force position with Eisenhower's "space for peaceful purposes" policy, as captured in the service's new slogan "Aerospace Power for Peace," but made clear the position that peace was best safeguarded through a strong military capability.[160] Together, these tenets provided senior Air Force leaders a common voice in the public forum.

Air Force congressional testimony in February 1960 reflected how the service put this policy to use. "We do not differentiate between aeronautic systems and astronautic systems," said Air Force Secretary Dudley C. Sharp.[161] "We do not view space to be a separate medium, but rather an extension of our previous horizons as a result of expanding technology," reiterated Sharp's undersecretary, Joseph V. Charyk.[162] White's deputy chief of staff for development, Lt Gen Roscoe C. Wilson, argued that

> [t]he Air Force, throughout its history, has constantly strived for greater speeds and higher altitudes…. Secondly, space is only a part of a large location which we call aerospace. …The Air Force does not compartment its activities into aeronautics and astronautics, or into nonspace and space. Because the aerospace is a continuous area of operations, our overall research and development program is oriented toward the fulfillment of military requirements in the most effective manner without regard to the question of where in the aerospace medium the necessary weapon systems will operate.[163]

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[160] Rosenberg, 11-12.

[161] Congress, House, Committee on Science and Astronautics, *Review of the Space Program: Hearings before the Committee on Science and Astronautics,* 86th Cong., 2nd sess., January 20, 22, 25, 26, 27, 28, 29, and February 1, 2, 3, 4, and 5, 1960, 424.

[162] House Committee, *Review of the Space Program,* 426-7.

[163] House Committee, *Review of the Space Program,* 479.

Buttressing the proliferation of their aerospace theme before Congress, senior Air Force leaders reiterated these same Air Force policy positions in their speeches around the country as well.

In Washington, D.C., before the National Press Club in mid-January 1960, White had this to say.

> Lacking specific guarantees that the benefits of space science and technology will be used solely for peaceful purposes, it is essential that we consider the application of this knowledge to our own military capabilities. There is no dividing line between air and space—they are one vast operating arena—and they must be considered as one medium—aerospace. …The development of nuclear warheads made it practical to develop aerospace vehicles with intercontinental range. …These technologies have advanced to the point where new controls for peace are conceivable. …there are certain specific military advantages that we can expect to gain from the extension of our capabilities farther out into aerospace.[164]

White repeated his message again before New York City's Union League in mid-April.[165] His vice, General Curtis E. LeMay, meanwhile, parroted him in San Francisco a day later.

> [California] is closely connected with our present-day Air Force and the Air Force of the future that is moving farther out into its natural medium—aerospace—that region which reaches from the surface of our globe to infinity.
>
> …I would like to review our overall concept. This we call aerospace power—consisting of manned and unmanned aircraft, missiles, and satellites and, in the not too distant future, manned and unmanned spacecraft. We built and will continue to build a blend of forces that operates in all parts of aerospace. Space is a natural extension of air and

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[164] As reprinted in House Committee, *Review of the Space Program,* 462.

[165] Thomas D. White, Gen, chief of staff, U.S. Air Force, "The Sky Has No Limits," Address, The Union League Club, New York City, NY, 21 April 1960, in U.S. Department of the Air Force, *AFIPL, Supplement,* No. 79. (date indiscernible) 1960, 1-4.

> as such aerospace operations are the basic elements of Air Force research, planning and programming.[166]

These are but a few examples of the external information campaign engineered and waged by Air Force leadership to expose the world outside of the Air Force to its aerospace perspective.

An External Challenge. Meanwhile, the third challenge foreshadowed in the February 1959 hearings and demanding the attention of senior Air Force leaders was a lingering threat from the other services. Recall that in establishing direct civilian control over America's burgeoning space program, Eisenhower had moved major pieces of it to NASA and consolidated the rest within the Defense Department under ARPA's responsibility. ARPA, in turn, redistributed the military parts back to the services but retained management and budget authority over them. Of the services' leash, the Air Force recouped an eighty percent share and came out a relative winner in the restructuring. However, it was evident in testimony during the February 1959 hearings that the Army, left with fourteen percent, and the Navy, with only six, were both unsatisfied with their lots. It appears, as well, that the Air Force was acutely aware of how fragile its own position was.

Just two days after General White introduced the aerospace concept to Congress, an in-house memo circulated within Air Force headquarters that anticipated the interservice wrangling likely still ahead. The memo reaffirmed "that space is an extension of the medium in which we are now operating in the accomplishment of assigned roles and missions." It also recognized, however, that the Air Force's possession of these roles and

[166] Curtis E. LeMay, Gen, vice chief of staff, U.S. Air Force, Address, The Commonwealth Club of California, San Francisco, CA, 22 April 1960, in U.S. Department of the Air Force *AFIPL, Supplement,* No. 79, 10, 13.

missions beyond the atmosphere, as of February 1959, was a "tenuous" one that needed to be secured more firmly with "demonstrated successes, available hardware, squatter's rights and the fait accompli…." Toward that end, it urged senior airmen to "assume the role of opportunist, aggressively taking advantage of each situation as it arises to assure that the Air Force is always predominant in any action that has a space connotation."[167] Just such a situation, indeed a crucial one, arose barely two and a half months later, when Admiral Arleigh A. Burke, the chief of naval operations (CNO), initiated a series of events that spun Air Force leadership into action and culminated in a secretary of defense decision five months later, now considered a landmark moment for the Air Force.

On 22 April 1959, Burke wrote the chairman of the joint chiefs of staff (JCS) urging the establishment a unified joint Military Space Command organized directly under the JCS and led by each service on a rotating basis. Burke's proposal envisioned an end to ARPA's jurisdictional control and an equal sharing among the services for responsibility in the nation's military space program.[168] Twelve days later, Army Chief of Staff General Maxwell D. Taylor, holding that space activities extend beyond the particular interests of any single service, fully endorsed the CNO's proposal.[169] The teamed bid of

[167] Hewitt T. Wheless, Maj Gen, U.S. Air Force, deputy chief of staff, Plans and Programming to the deputy chief of staff, Development, 5 February 1959, Memorandum, "Air Force Objectives in Space," K140.8638-2, December 1965 – August 1967, IRIS 1003008, in USAF AFHRA, 1-2. Portions of this memo also quoted in David N. Spires, "The Air Force and Military Space Missions: The Critical Years, 1957 – 1961," in *The U.S. Air Force in Space, 1945 to the Twenty-first Century: Proceedings of the Air Force Historical Foundation Symposium at Andrews AFB, Maryland, September 21-22, 1995,* ed. R. Cargill Hall and Jacob Neufeld, by the USAF History and Museums Program, Washington, D.C.: U.S. GPO, 1998, 39.

[168] Craig Lewis, "Navy Bids to Capture Major Space Role," *Aviation Week* Vol. 71, no. 4 (27 Jul 1959): 26. Also referenced in Max Rosenberg, *The Air Force in Space: 1959 – 1960,* K168.017, 1959 – 1960, IRIS No. 472256, in USAF Collection, AFHRA, 18, and Spires, *Beyond Horizons,* 76.

[169] Rosenberg, 18, Spires, *Beyond Horizons,* 76.

General White's counterparts constituted the boldest challenge yet to the Air Force's aerospace aspirations.

The Air Force response was swift. A 12 May memo from General White to the JCS rejected the Burke proposal with an aerospace-based argument that space systems simply represent a more effective way to perform what were already Air Force-assigned missions.[170] Reiterating a position enunciated by Lt Gen Schriever three weeks earlier in Senate testimony, White agreed with his service chief colleagues that the current structure under ARPA was problematic, but because the military's future in space was simply an extension of the Air Force's current responsibilities, the Air Force alone was best suited to manage that future.[171]

Two months of wrangling ensued among the service chiefs and the JCS. Unable to reach common ground on the issue, the JCS on 24 July 1959 forwarded two divergent views to Defense Secretary McElroy. One, strongly supported by the Navy, the Army, and the JCS, called for the creation of a joint space operations command. The other, held by airmen alone, was the Air Force's original stance.[172]

Aviation Week exposed the Defense Department's discord just three days later. Establishing a joint space command, it reported,

> …runs against the USAF philosophy that setting an arbitrary border between the atmospheric field of normal Air Force operations and a space area for joint command is nonsense. Air Force believes that space is an area where its own operations will be expanding naturally with

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[170] Rosenberg, 18. See also Lee Bowen, *The Threshold of Space: The Air Force in the National Space Program, 1945-1959,* September 1960, USAF Historical Division Liaison Office, in Jeffrey Richelson, ed. *Military Uses of Space, 1945-1991,* Washington, D.C.: The National Security Archive and Chadwyck-Healey (hereafter NSA), 1991, No. 00319, Microfiche, 32.

[171] Spires, *Beyond Horizons,* 76, and Senate Committee, *Investigation of Governmental Organization for Space Activities*, 417. Testimony also cited in Ford Eastman, "Gen. Schriever Asks ARPA Abolishment," *Aviation Week* Vol. 70, no. 18 (4 May 1959): 29.

[172] Rosenberg, 19.

technological progress, not a place where an entirely new organization and new operations should be established.[173]

Coverage such as this facilitated the aerospace concept's diffusion to audiences well beyond Air Force walls. So too did evidence that the idea was influencing policy, even if indirectly.

Secretary McElroy's decision on the Burke proposal, which he announced in September, represents a watershed event for the Air Force. In a formal memo to the chairman of the JCS, McElroy affected a significant reorganization of the nation's military space program. He sided with all of his service chiefs where ARPA was concerned and scaled back its purview to advanced military research alone. He maintained civilian oversight on the military space program through his Director of Defense Research and Engineering (DDR&E), Dr. Herbert F. York, but shifted responsibility for the military's various space programs back into the hands of their users.[174] In this regard, however, for "economy and efficiency," McElroy placed "operation of all DoD boosters," along with responsibility for marrying them with their payloads, under the Air Force.[175] Finally, and more importantly, McElroy stated that the "establishment of a joint military organization with control over operational space systems does not appear to be desirable at this time."[176] In the dust that settled, while the Army and Navy still owned and operated a few specific communication and navigational

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[173] Lewis, 27.

[174] Futrell, *Ideas, Concepts, and Doctrine,* Vol. 1, 593.

[175] Rosenberg, 20. ABMA, the Army's ballistic missile organization that housed Von Braun's team and was developing the Saturn rocket, was transferred during this period to NASA. See Mark A. Erickson, "The Evolution of the NASA – DoD Relationship from Sputnik to the Lunar Landing" (Ph.D. diss., Columbian School of Arts and Sciences of The George Washington University, 18 May 1997), 167-73 for details.

[176] As quoted in Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-84* (Ithaca, NY: Cornell University Press, 1985), 43-4.

satellite programs, September 1959 marks the point when the Air Force effectively became the service responsible for the nation's military space capabilities.[177]

During the two-year span between January 1959 and January 1961, Air Force leaders focused more attention and effort than ever before propagating the idea that air and space form a single continuum. To their own, they concentrated on education and persuasion. To Congress and the broader public, the goal was exposure. Throughout this conscious and deliberate campaign, Air Force leadership also leveraged the aerospace concept in their arguments to solidify and protect the Air Force's space-related organizational interests. Moreover, these arguments bore fruit. In short, the Air Force became an organization awash in the aerospace concept. Infused in the service's policy, and more significantly, its doctrine, the idea had generated substantial traction within the service.

To a lesser extent, but also importantly, the concept made inroads into the Air Force's external environment as well. One measure of this emerged in early 1961. Sometime during the year prior, the editors of *Webster's New World Dictionary of the American Language* determined that the word "aerospace" had been observed often and consistently enough in various forms of non-technical media such that it had become "established and was likely to have staying power" within the American lexicon.[178] They added the Air Force-coined term, not even three years old by this point, into the 1960

[177] Spires, *Beyond Horizons,* 77-8.

[178] This editorial standard for dictionary inclusion is based on telephone interviews with Ms. Joanne M. Despres, senior editor of Merriam-Websters Dictionary, on 3 August 2005 and Mr. Michael Agnes, editor in chief of Webster's New World Dictionaries, on 9 August 2005.

copyright of their College Edition.[179] Airmen proudly took note of the fact as the dictionary found its way onto bookshelves.[180]

An objectifying institution, however, is but semi-developed. During objectification, organizational members yet convinced of the developing institution's appropriateness are still testing it, still consciously monitoring its value and questioning its utility. And where the Air Force and its aerospace concept are concerned, evidence shows this too was happening.

Ambivalence and Disagreement. Military organizations are vertically structured and strongly hierarchical, and within them, indications of pushback or dissent to organizational policy can be difficult to observe. Generally, the soldier goes where his leaders point, and with little question. Thus, the subtle signs of dissonance between airmen and the aerospace concept that emerged, though few, merit mention.

One such sign appeared in early 1961. Nine straight copies of Air Force "Information Policy Letters"—from June 1959 to February 1960—explicitly addressed what, why, and how Air Force commanders should pitch the aerospace concept. Thereafter, the publication was silent on the subject until January 1961, when it noted on its front page, "[s]ome speakers and writers are still a little confused about the meaning of the word 'aerospace.' Some seem to have the idea that 'aerospace' is merely another word for 'space.' …Other[s] are confused by the question: What is an aerospacecraft?"[181] The fact that Air Force Information Director Major General Arno H. Luehman thought this was enough of an issue to warrant addressing it within this forum

[179] *Webster's New World Dictionary of the American Language,* College ed., copyright 1960, s.v. "aerospace" (on page 23).

[180] Department of the Air Force, *AFIPL* XV, no. 11., 15 May 1961, 4.

indicates the idea had generated a certain amount of ambiguity and was encountering friction as it penetrated the organization.

Significantly, a source of some of this friction was General Schriever. Given that he had long been the guiding hand in the Air Force's emerging missile and satellite capability, his comment, following General White's introduction of the aerospace concept to Congress in February 1959, that "space is another medium" was understandable. Thereafter, however, assuming that Schriever understood the Air Force's official perspective on their operational medium, one should find evidence of him adopting it in his future discourse. Instead, evidence suggests the contrary.

In an address to the Los Angeles Chamber of Commerce a month following the hearings above, Schriever spoke of ballistic missiles as "space vehicles" because "they travel most of their distance outside of the earth's atmosphere." He opined about future "space projects," "space probes," "space vehicles," and "manned space ships." Nowhere, however, did he mention or imply anything remotely supportive of, or even attributable to an aerospace frame of mind.[182]

A month later, on 23 April 1959, having just been promoted to Lieutenant General and moved upward to replace Lt Gen Anderson as ARDC's new commander, Schriever testified before the Senate Subcommittee on Governmental Organization for Space Activities. In the opening sentences of his prepared remarks, he indicated a full awareness of the aerospace concept and its stature as Air Force policy. On script, Schriever began with the company line.

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[181] Department of the Air Force, *AFIPL* XV, no. 1. 1 January 1961, 1.

[182] Bernard A. Schriever, Maj Gen, U.S. Air Force, "Lead Time – The Space Age Challenge to Management," Address, the Los Angeles Chamber of Commerce, Los Angeles, CA, 5 March 1959, in Department of the Air Force, *AFILC, Supplement,* no. 77, May 1959, 13-4.

> Space, up to now, seems to have been treated as a thing apart—as an end unto itself. Actually, it can be better understood when it is viewed as just what it is, an extension of a medium—aerospace. …There are no barriers between air and space. The two comprise an indivisible field of operations.[183]

Yet, through the rest of his statement, he spoke only of "space," of space systems, space development, and space's future. His language, word choices, and ideas showed no hint of an aerospace perspective or feel. Moreover, he closed his twenty-five minute presentation with the following:

> In summary, I would like to leave these observations with the committee:
>
> (1) Space is a medium in which many military missions can be performed better than on land, sea, or in the atmosphere…."
>
> (2) Those military space weapons now under development…are merely the forerunners of yet-to-be-developed weapons systems for operations in space.
>
> (3) The critical importance of achieving space weapons capability…[requires] that we compress leadtime to a minimum.
>
> (4) The successful attainment of our peaceful objectives to operate freely in space, both in civilian and military programs, can be best assured by taking the steps necessary, in space as elsewhere, to provide for national security.[184]

Whatever his opening words may have indicated, Schriever's finish leaves little doubt that he had not yet bought into his service's aerospace concept.

Six months later, General Schriever published a 14-page article in *Airman*, a service-sponsored public affairs magazine distributed to the entire force. It was titled "The Shape of Things to Come," it presented a broad and sweeping vision of the Air Force's future, and it opened with a perspective quite different from General White's: "October ushers

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[183] Senate Committee, *Investigation of Governmental Organization for Space Activities*, 396.

[184] Senate Committee, *Investigation of Governmental Organization for Space Activities*, 403-4.

in the third year of the Space Age."[185] Thereafter, Schriever used the word "space" on sixty-five occasions, but "aerospace," on the other hand, not once. Not even, for example, when a perfect opportunity presented itself. "As the next decade lengthens," the ARDC commander wrote, "we look to the success of the Dynasoar development experiment to give the inventory a manned strategic vehicle operable in the sensible atmosphere and perhaps to the borderline of true space."[186] To an aerospace attuned ear, the entire tone of Schriever's article might have been construed as subtly defiant of the aerospace concept. At a minimum, he was still unsupportive of the idea.

In May 1960, addressing the National Catholic Press Association, Schriever indicated an acceptance of aerospace in the broadest sense—

> My own concern in space activities quite naturally is primarily that which is seen from the eyes of the military man whose first responsibility is the development of an aerospace force sufficient to deter any armed assault on our nation.[187]

—but he forwent any opportunity to promote the idea. He still spoke only of "space as a medium" of its own, not as a part of aerospace. Touting the increasing capability of "missile and space technology," Schriever argued that "to realize our full space potential, we must recognize that space is a medium through which vehicles intended for both peaceful and defense purposes can travel."[188]

Where the institutionalization of the aerospace concept is concerned, Schriever's expressed positions during this period are important in two respects. First, sitting at the

[185] Bernard A. Schriever, Lt Gen, "The Shape of Things to Come," *The Airman* III, no. 10 (October 1959): 18.

[186] Schriever, "The Shape of Things to Come," 21.

[187] Bernard A. Schriever, Lt Gen, U.S. Air Force, "National Security and Space," Address, The National Catholic Press Association, 11 May 1960, in Department of the Air Force, *AFIPL, Supplement,* No. 82, August 1960, 18.

[188] Schriever, "National Security and Space," 20.

forefront of the Air Force's emerging space-related capabilities since the summer of 1954, when America's "Missile Man" spoke on such matters he carried authority and credibility. As such, his influence over the development of other people's perspectives, both within and outside of the Air Force, was substantial. When Schriever, as an Air Force general, spoke of "air and space" instead of "aerospace," people still forming their own conclusions between the two perspectives no doubt took notice.

Second, and more importantly, when he became the ARDC commander in April 1959, he assumed direct authority over all of the Air Force organizations responsible for developing and fielding the service's aerospace-enabling technologies. Given his personal resistance to the aerospace concept, as organizations under his charge restructured, it would be out of character for him to promote changes that encouraged an aerospace perspective, or to impede structural changes that did not. The point is significant because Schriever played a leading role in two separate reorganizations within the Air Force's R&D community that would influence the aerospace concept's long-term institutional prospects within the Air Force.

ORGANIZING OTHERWISE

Organizational structure that reinforces the notion that air and space are indivisible encourages aerospace concept institutionalization. On the other hand, structure that separates air from space discourages it. Thus far, the Air Force's research and development agencies had been the caretakers of the service's aerospace enabling capabilities, and by early 1959, these organizations had evolved into a decidedly air and space structural arrangement. The Wright Air Development Center (WADC) pursued aircraft-related technology and housed Dyna-Soar, the Air Force's most promising aerospace-embodying program. However, the vast majority of systems with any capacity to operate beyond the atmosphere—ballistic missiles, satellites, and the rockets that propelled them both—were nurtured at the Air Force Ballistic Missile Division (AFBMD), which until April 1959 had been under the command of General Schriever.

Also by early 1959, AFBMD's missile programs were beginning to mature, and their migration from the development world to the operational world had become a looming issue. This promised AFBMD a certain amount of organizational slack ahead, but it posed some difficult broader questions with respect to how the transfer of organizational and programmatic responsibilities should unfold. In short, in early 1959, the Air Force and its R&D community saw opportunities and impetuses to take stock, assess, and if worthwhile, restructure.

Reorganizing Air Force R&D. One such restructuring arose from the Stever Committee Report submitted to General White in the summer of 1958.[189] Spurred by the general reassessment of America's space program in *Sputnik's* aftermath, the Stever Committee had found significant inefficiencies within the Air Force's system-oriented R&D process. Following a penetrating investigation, they had recommended that the way to alleviate many of ARDC's inefficiency and duplication of effort issues was to dismantle the command's system-based structure and reorganize the Air Force's R&D community around the general functions of the technology development process.[190]

By February 1959, ARDC's commander at the time, Lt Gen Anderson, had studied the Stever Report for six months. In an indication of the inertia the report's

[189] See Chapter 5, p. 173-4.

[190] Robert F. Piper, *History of the Space Systems Division, January – June 1962,* Vol. I: *The Space Systems Division—Background (October 1957- June 1962),* K243.031 January – June 1962, IRIS No. 897250, in USAF Collection, AFHRA, 69-70.

recommendations were up against, Anderson declared its objectives achievable only through "radical and wholesale upheaval of the existing [organization]."[191] He then pushed the whole issue off until the end of April, when a new commander, Lt Gen Schriever, would take charge.

Schriever, three weeks into his role as the senior-most officer of the Air Force's entire R&D infrastructure, appointed a special task force to shape the Stever Committee's recommendations into a less drastic option.[192] Working throughout the summer in an iterative process with their new commander, the task force developed a compromise proposal. They applied the Stever Report's function-based premise to a restructuring of ARDC's headquarters. The task force, however, left the command's field organizations—where the actual research and development occurs, and, consequently, where the vast majority of the command's resources and personnel reside—largely in their systems-oriented arrangement.[193]

Indeed, where this study is concerned, the organizational and geographical cleavage between air-oriented and space-oriented organizations that the Stever recommendations would have overhauled was left virtually intact. The Wright Air Development Center in Dayton, Ohio stayed put, remained responsible for all aeronautical-related systems (and Dyna-Soar), subsumed a few smaller test centers, and simply became the Wright Air Development Division (WADD). The Air Force Ballistic Missile Division, meanwhile,

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[191] Piper, 70.

[192] Piper, 71.

[193] *History of the Air Research and Development Command*, Vol I, K243.01, July – December 1959, IRIS No. 484807, in USAF Collection, AFHRA, III-153, III-154. The headquarters restructuring moved from a deputy command arrangement (which included partitioned commands for air defense systems, ballistic missiles, weapon systems, and research) to a deputy chief of staff structure organized in directorates (personnel, plans, intelligence, materiel, comptroller, and research) in order to offer broad-based staff support across the command.

remained in Inglewood, California still organized around and responsible for all of the Air Force's missile and space-related programs.[194]

Schriever approved and initiated the ARDC reorganization on 5 October 1959, just in time to capture the programmatic changes that Defense Secretary McElroy's dismantling of ARPA in Washington had spurred. However, an opportunity to help instill and further perpetuate an aerospace perspective within the Air Force, indeed in the organizational area where at this point it mattered most, was scuttled. Inadvertently or not, within the Air Force space remained structurally separated from air.

A Bold Proposition. Meanwhile, as Schriever began exploring ARDC's organizational possibilities in May 1959, General Curtis E. LeMay, the Air Force Vice Chief of Staff, set in motion the beginnings of what would evolve in two years time into a much more significant structural development. Again, the looming transfer of ballistic missile systems out of the development world and into the operational Air Force coupled with increasing political pressure to keep up with the pace of Soviet technological developments moved the Air Force's second in command to examine the service's systems development process in general.[195] On 29 May, LeMay established the Weapon Systems Study Group (WSSG) "to review the policies and procedures for management of Weapon and Support systems throughout their [entire] life cycle."[196] The group was chaired by the Commander of Air Materiel Command (AMC), General Anderson, and

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[194] *History of the Air Research and Development Command*, July – December 1959, III-152.

[195] *History of the Air Research and Development Command, 1 January – 31 March, and Air Force Systems Command, 1 April – 30 June, 1961,* Vol. I, K243.01 January – June 1961, IRIS No. 484821, in USAF Collection, AFHRA, 3-6.

[196] Curtis E. LeMay, Gen, vice chief of staff, U.S. Air Force, 29 May 1959, Memorandum, "Weapon Systems Management," *History of ARDC/AFSC, 1 January – 30 June 1961,* Vol. 3: *Supporting Documents,* Document 4, K243.01, January – June 1961, IRIS No. 484823, in USAF Collection, AFHRA, 1.

made up of six other key lieutenant generals from throughout the Air Force, of whom one, importantly, was Schriever.

The core issue confronting this team was how to improve the transfer of systems, given their increasing complexity and specificity, from R&D organizations into their operational homes. The specific test case pushing the issue was the approaching operationalization of Air Force ballistic missile programs, but the difficult questions this was raising applied to all emerging systems.[197] As system sophistication increases, how and to what extent should the service transfer the specialized expertise and experience acquired through R&D to the operational world? When is the appropriate time in a system's lifecycle to make the move? How does manufacturing and procurement on the operational side of a system's life cycle keep apace with leading edge technological changes that emerge from continued R&D? Which organizations are responsible for which aspects of a system's lifecycle? These were the kinds of questions that the WSSG wrestled with.

The specific arguments and considerations raised throughout their proceedings were complex and fascinating. Important to this study's perspective, however, was simply that the fifteen-month effort culminated with little common ground having been found regarding answers.[198] The deliberation wielded three different camps among the WSSG's seven primary members. One of these, importantly, was a minority position advocated only by Lieutenant General Schriever, who held that "development, procurement, and production of new systems must be under a single manager."[199] Schriever's perspective

[197] *History of the Air Research and Development Command, 1 January – 31 March*, 7-22.

[198] *History of the Air Research and Development Command, 1 January – 31 March*, 21.

[199] *History of the Air Research and Development Command, 1 January – 31 March*, 10.

here is noteworthy because, though it found no supporters in this forum, it would resurface again in less than a year to profound affects.

Meanwhile, Generals White and LeMay, faced with this stalemate, essentially opted for a status quo way forward, which from Schriever's perspective, left him still with the immediate problem of affecting a smooth transfer of his missiles to their operators. Also, however, because of Schriever's intimate involvement in the WSSG process, he had earned leverage and credibility to engage with the Air Force Chief of Staff thereafter directly.

On 23 September 1960, just a month after the WSSG effort wound down, Schriever sent General White a personal letter of bold proportions. "The Air Force is the major contributor to the national space posture," he wrote. "[B]ut,… we do not have a well-defined USAF space program, nor do we have a nationally recognized operating management entity oriented towards full exploitation of space technology." AFBMD, he submitted, had "the greatest capability of performing the military space mission," and it had a "national image in the space field." However, "aspects of current ballistic missile and space management" were preventing "rapid progress by the Air Force in the broad and challenging tasks which face us in space."[200]

Schriever argued that the broad issues the WSSG failed to remedy, where his ballistic missile programs were concerned, had affected "a serious and substantial diversion of management attention" and had led AFBMD to lose its "singleness of purpose" and "become large and cumbersome." The ARDC commander then offered the

[200] Bernard A. Schriever, Lt Gen, U.S. Air Force, Commander ARDC, 23 September 1960, Letter, *History of ARDC/AFSC, 1 January – 30 June 1961,* Vol. 3: *Supporting Documents,* Document 12a, K243.01, January – June 1961, IRIS No. 484823, in USAF Collection, AFHRA, 1.

Air Force chief of staff "an approach which could largely solve the problems [he had] outlined."[201]

> Specifically, I propose:
>
> Formal action by Hq USAF to completely integrate the Atlas, Titan, and Minuteman program into the normal USAF organizational and functional structure.
>
> …The current ballistic missile programs be phased from the Inglewood complex [AFBMD] as rapidly as possible….
>
> The Inglewood complex… under ARDC management become the permanent focal point and be strongly identified as the USAF military space development agency.
>
> A planned information program be undertaken to exploit the USAF position in military space endeavors and define its future.[202]

General Schriever, in September 1960, proposed a plan to move the ballistic missile programs out of AFBMD completely, and to create from what remained, an Air Force center known for, dedicated to, and focused exclusively on space.

Context is an important consideration in examining General White's response. Schriever sent his letter on 23 September 1960. At the time, Vice President Richard M. Nixon and Senator John F. Kennedy were engaged in a presidential race in which Kennedy had made the relative weakness of the nation's space program a key focal point in the his campaign. On 26 September Nixon was badly been beaten in the first of four televised debates between the two. The next day, Kennedy released a nine-point national security proposal very much focused on the nation's space program. And on 10 October, his detailed thoughts behind this proposal were published and widely disseminated to the American public. Kennedy's underlying premise regarding space was this:

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[201] Schriever, 23 September 1960, Letter, 2.

[202] Schriever, 23 September 1960, Letter, 3.

> We are in a strategic space race with the Russians and we have been losing… Control of space will be decided in the next decade. If the Soviets control space they can control earth, as in the past centuries the nations that controlled the seas dominated the continents.
>
> …[We must] recognize that "space for peaceful purposes" is possible only if "freedom of space" *is ensured*; hence the U.S. military must be given a predominant role in developing and carrying out the projects necessary to guarantee freedom of space.[203]

These were no doubt welcome words for Air Force leadership. Given its future designs beyond the atmosphere, the election was a particularly important one for the service. And White likely had these thoughts on his mind when turning his attention to Schriever's proposal.

The day that Kennedy made public his campaign position, that the military needed to be given the room to secure freedom of space, White wrote his reply to the Schriever. "Dear Bennie, …I agree that we must examine carefully our role in the space era. We need an appraisal of our long term approach to strategy and operations in space and a comprehensive technological plan which would give us a sound basis for moving into space."[204] White's language was decidedly out of character from his long-established aerospace point of view. Indeed, just three months later, as has already been discussed, he would urge all airmen in his *AUQR* article to recognize aerospace "in its entirety when analyzing our concepts, when examining the performance capabilities of our weapons, and when determining the structure and disposition of our forces."[205] Yet, here the Air

[203] John F. Kennedy, Senator, "If the Soviets Control Space, They Can Control the Earth," *Missiles and Rockets* (10 October 1960): 12. Also in Stares, 72, Robert Frank Futrell, *Ideas, Concepts, and Doctrine,* Vol. 2, *Basic Thinking in the United States Air Force 1961-1984* (Maxwell Air Force Base, AL: Air University Press, December 1989), 214, and John. M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, MA: The MIT Press, 1970), 66. Emphasis mine.

[204] Thomas D. White, Gen, chief of staff, U.S. Air Force, 10 October 1960, Letter, *History of ARDC/AFSC, 1 January – 30 June 1961,* Vol. 3: *Supporting Documents,* Document 12b, K243.01, January – June 1961, IRIS No. 484823, in USAF Collection, AFHRA, 1.

[205] White, "The Aerospace and Military Operations," 4.

Force chief of staff threw his full support behind Schriever's space center vision—a vision, organizationally, that encouraged the perspective that space was a separate entity. "Approved," White wrote, "provided the plan developed [by all affected parties]… is satisfactory."[206]

Plans of such scope take time to create; Schriever wasted none. On the following day, he renewed old ties with a key figure from the earliest days of the Air Force's ballistic missile program. Establishing the Air Force Space Study Committee, he invited Trevor Gardner to chair this committee's effort to

> [u]ndertake a technical evaluation of existing and planned space systems and recommend a space development program for the USAF which would extend as far as practicable into the future and which would be designed both to provide the nation with a significant military space capability by mid-1965 and to advance the national prestige.[207]

Schriever, in his note to Gardner, drew an explicit parallel between this group's purpose and the Teapot Committee's from early 1954 that Gardner had led, and then said, "I can think of no one I would rather have act as chairman of such a group than yourself *(sic)*."[208]

Gardner accepted, formed a group of nationally prominent figures that met often over the next five months, and submitted a report to General Schriever finally on 21 March 1961. The implications of their study and the effect these events had on further restructuring within the Air Force all come to bear in the first spring under a new president. They are thus reserved for discussion in the next chapter. Significantly, in

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[206] White, 10 October 1960, Letter, 3.

[207] Report of the Air Force Space Study Committee, 20 March 1961, *History of ARDC/AFSC, 1 January – 30 June 1961,* Vol. 3: *Supporting Documents,* Document 15, K243.01, January – June 1961, IRIS No. 484823, in USAF Collection, AFHRA, 56.

[208] Report of the Air Force Space Study Committee, 57.

mid-November, president-elect Kennedy would ask a key member of Gardner's Air Force Space Study Committee, Dr. Jerome Wiesner, to join his transition team and conduct a thorough review of the nation's space program. Gardner would contribute to that effort as well.

Organizational structure facilitates the institutionalization of organizational ideas by giving them a measure of tangibility that extends beyond words—provided structure reinforces and perpetuates the idea. However, during the final two years of the Eisenhower presidency, while the Air Force was avidly promoting the notion that air and space were indivisible, the only organizations it had with any potential to adopt structures supportive of that concept were instead opting for structure wholly antithetical to it. In the summer of 1958, AFBMD's space character was subtle in nature, but by the close of 1960, there was nothing subtle about it any more.

SPENDING AS ORGANIZED

Organizations plan for and spend resources on things that promote their focus. Thus, programs that reinforce an organization's objectives enjoy a natural advantage over those that do not. Given how the Air Force's emerging R&D structure was organizing itself during the final two years of the Eisenhower presidency, it is not surprising that the Air Force's space-enabling systems fared much better than its aerospace-enabling counterpart did. The former, nestled comfortably within AFBMD, found plenty of nourishment to grow and proliferate. Dyna-Soar, on the other hand, stumbled upon much harder times. In an Air Force committed officially to the aerospace concept, as its most aerospace-like future system, Dyna-Soar held great promise. However, in the service's R&D world structured to promote an alternative perspective, the aerospace vehicle wallowed in no-man's land, wont of advocates and top-cover.

Space-Enabling Systems. AFBMD programs saw significant growth during the final two years of the Eisenhower presidency and the division acquired substantial organizational influence within the Air Force. Despite accounting for only 0.3% of the Air Force's total workforce, the Ballistic Missile Division's FY 1960 budget allocation represented 14% of the Air Force's total ($2.6 of $18.5 billion).[209] Wrapped up within these budget figures were various emerging programs needed to support a burgeoning space capability.

This period saw AFBMD make progress on more sophisticated second-stage rocket designs—in programs named Agena, Able-Star, Able, and ABL 248, for example—that enabled ground-directed orbital adjustment and control of the satellites they propelled.[210] Another program office within the division completed preliminary (on 10 August 1959) and revised (on 8 February 1960) plans for a *sa*tellite *int*erceptor and inspection system, nicknamed Saint. By June 1960, the proposal had garnered limited R&D funding.[211] Also, in the spring of 1960 AFBMD began development on a "logical approach to establishing a manned base on the moon"—a project that planners deemed technologically and operationally feasible, if costly, by 1969. By the fall, follow-on studies were turning to the problems associated with lunar transport vehicles, support for

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[209] Piper, 7, see asterisk at page bottom. FY 1960 covers the period between 1 July 1959 and 30 June 1960.

[210] Piper, 10.

[211] Piper, 20-1, Stares covers the development this program in greater detail – see 112-120 in particular.

a lunar base, and actual base designs.[212] Amid all of these space-enabling programs, however, AFBMD's jewels remained its satellite systems—Samos and Midas—left over from WS-117L after Eisenhower quietly calved away the CORONA project. These programs had been elevated to national priority status in *Sputnik's* aftermath.[213]

For both the Samos and Midas programs, however, 1959 was a frustrating year. Under ARPA's management, internal and external indecision led planners to draft nine different development plans between the two programs, with none, for a variety of reasons, ever being approved. Funding reductions, announced by ARPA in June and based on competing demands from other DoD space projects, further exacerbated the programmatic wandering.[214] Under such conditions—limited funding and uncertain objectives—the satellite systems consequently lost momentum.[215] Whereas the year's beginning saw the initial operational capability of both set for October 1961, by its end Midas' date had slipped three times to April 1963, and Samos' had moved even later to July.[216]

Three things, however, helped rejuvenate the development of these systems by the end of 1960. Secretary McElroy's decision to shut down ARPA removed a hefty layer of bureaucracy.[217] The Soviet downing of a U-2 in May 1960 brought a resurgence of

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[212] Piper, 43.

[213] Recall that CORONA's secrecy was maintained in part through the cover story of an Air Force program dubbed "Discoverer."

[214] Rosenberg, 31-2.

[215] Piper, 14, 16.

[216] Rosenberg, 33-4.

[217] Piper, 10, and Roy Franklin Houchin, II, "The Rise and Fall of Dyna-Soar: A History of Air Force Hypersonic R&D, 1944-1963" (Ph.D. diss., Auburn University, 30 August 1995), 217.

political support for reconnaissance satellites.[218] And finally, the Midas program scored a timely technological success. After a failed first launch on 26 February 1960, a second attempt in late May propelled a satellite into the "most perfect circular orbit achieved by the United States."[219] Thus, by the close of 1960, appropriate funding had returned, program direction was restored, and these systems were back on track, albeit a bit behind their original timelines. Moreover, they were securely housed within an organization that was both growing and specializing exclusively in the development, support, and maintenance of rocket-launched, orbital, exo-atmospheric systems. A somewhat different experience, meanwhile, befell Dyna-Soar.

Dyna-Soar Development. 1959 and 1960 marked a period in the hypersonic vehicle's development process where its program managers were ready to start awarding contracts to begin expanding their project from preparation and planning into actual construction and testing. But as real money became a need, the system's front line advocates found themselves struggling against two significant constraints.

First, under WADD's roof in Dayton, Ohio, Dyna-Soar was a fringe system within a research division focused on the development of airplanes and air breathing systems. Exacerbating this was the fact that the program was also tethered—by virtue of its rocket propulsion system—to AFBMD. Thus, the program effectively straddled two organizations within the Air Force's R&D community, but furthered the primary purpose of neither.

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[218] This event actually had a significant impact on the future course of the Samos program, a discussion left for later in the chapter.

[219] Piper, 14.

Second, and more significantly, the Air Force's long-range plan for Dyna-Soar challenged Eisenhower's space for peaceful purposes policy directly. Recall from the summer of 1958, that the air staff projected its budding hypersonic *orbital* vehicle to be one that would "succeed turbojet-powered manned strategic bomber and reconnaissance systems."[220] As the future embodiment of "higher, faster, further," Dyna-Soar was conceived first and foremost as a weapon system. But as this system matured toward hardware development, the administration's appointed Defense Department civilians increasingly engaged to hold the Air Force's future aerospace bomber in check.

In early January 1959, Deputy Secretary of Defense Donald A. Quarles released $10 million funding to the program but under the explicit stipulation that it "was only an approval for a research and development project and did not constitute recognition of Dyna-Soar as a weapon system."[221] Three months later, Dr. York, the DDR&E, pulled in the Air Force's reins by firmly limiting the first phase of Dyna-Soar's development plan to "*non-orbital* hypersonic flight"—non-orbiting meant non-space.[222] And in early July, Air Force Under Secretary Malcolm A. MacIntyre reiterated yet again the administration's weapon system concerns with questions about the political and economic costs of configuring a test vehicle with weapon-related sub-systems. He also

[220] Letter (S), Swofford, Acting DCS/D to Comdr, ARDC, 25 Jun 58, subj: Selection of Contractor for WS-464L (DYNA SOAR), as cited in Bowen, 35.

[221] Clarence J. Geiger, *History of the X-20A Dyna-Soar,* October 1963, Air Force Systems Command, Aeronautical Systems Division, Information Office, Historical Division, 37 (available in Air University Library Documents collection: M-U 37052-22 1963 no. 50-I). Also referenced in Clarence J. Geiger, "Strangled Infant: The Boeing X-20A Dyna-Soar," in *The Hypersonic Revolution: Eight Case Studies in the History of Hypersonic Technology,* Vol. I: *From Max Valier to Project PRIME (1924-1967),* ed. Richard P. Hallion, 185-377 (Wright-Patterson Air Force Base, OH: Aeronautical Systems Division, 1987), 217.

[222] Geiger, "Strangled Infant," 219. Emphasis mine.

raised issues about booster development and, interestingly, the service's choice to locate the Dyna-Soar program at WADD instead of at AFBMD.[223]

With outside scrutiny honing in on the program, the effects of Dyna-Soar's precarious organizational position, and the attendant dearth of mid-level managerial attention that came with it, then became apparent. The project wallowed through the spring and summer of 1959 and its momentum eroded to the point where the Air Force chief of staff was finally energized to engage. At a time when General White was pushing his aerospace idea hard, he felt impelled to step in and prod along the system that could fully embody it. Expressing in October 1959 his dissatisfaction with its lack of progress, White directed the Dyna-Soar program team "get off dead center."[224] Interestingly, there seems to have been no engagement on this issue from Lieutenant General Schriever, who as the ARDC commander at this point, was directly responsible for both WADD and AFBMD.

On 1 November, the Dayton-based program office submitted an updated development plan to the air staff.[225] Seventeen days later, White and Air Force Secretary James H. Douglas approved it and directed ARDC to implement its first phase—manned boost-glider sub-orbital flight, as York had required, with its scheduled test flights beginning in April 1962.[226] ARDC awarded contracts, the Air Force's Scientific Advisory Board announced shortly thereafter that Dyna-Soar had become "potentially the most important space program in the country,"[227] and this sudden outburst of progress in

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[223] Rosenberg, 47.

[224] Bowen, 38.

[225] Geiger, "Strangled Infant," 226.

[226] Houchin, 217, Rosenberg, 47, and Geiger, *History of the X-20A Dyna-Soar,* 48.

[227] Houchin, 223-4.

the program prompted a leading defense journal to report that the "Air Force has soared back into the national space program in a big way.... [Dyna-Soar] will be capable of conducting reconnaissance, and bombing missions anywhere on earth. It also may be used to intercept enemy satellites and spacecraft." The journal also noted, however, that the "Air Force decision to go ahead with the program,... appeared to be a sharp reversal of the recent Administration trend to take the armed forces out of space."[228] Indeed.

Accordingly, civilian reticence continued to hold fast. Almost immediately, Dr. Joseph V. Charyk, the Assistant Secretary of the Air Force for R&D weighed in to pressure the air staff and Dyna-Soar's project managers to clarify their program's intent and purpose. On 24 December, he directed a systematic review of the program and held up further research funding until the review was completed. This stymied forward progress for another three months as the Dyna-Soar team complied with Charyk's directive.[229]

In April 1960, Dyna-Soar's managers finished their review and returned to Washington to present an updated development plan to Schriever, other air staff leaders, and finally to Dr. York. They held fast to a sub-orbital first phase of testing, but made it even more politically palatable by explicitly gearing it toward basic research alone. They envisioned flight-testing for this phase to begin in July 1963. In another gesture to the political sensitivities, the planners further deemphasized Dyna-Soar's weapon system attributes by expressly devoting phase two testing to the system's on orbit reconnaissance

[228] James Baar, "Dyna-Soar Puts AF Back in Space," *Missiles and Rockets* (16 November 1959): 49. See also Bowen, 38.

[229] Geiger, "Strangled Infant," 227, and Houchin, 218.

and satellite inspection utility. For the program's third and final phase, however, the Air Force remained focused on the system's long-term weapon capability.[230]

York, satisfied enough with the updated plan, approved it on 19 April and released R&D funds to the Air Force. Once again, though, he reiterated his earlier position from the previous fall and authorized money only for the program's first phase.[231] With that, ARDC would implement Dyna-Soar's various contracts throughout the summer and by December 1960, phase one would be up and running. But York's April decision had come with a bittersweet caveat.

Along with the release of funds, the Defense Department's research and engineering director had downgraded Dyna-Soar to a "contingency program" because the Air Force had yet to identify sufficiently a specific military requirement for a manned space vehicle.[232] The calculus here was implicit, but readily apparent. Dyna-Soar, as an orbital *weapon* system, could be trumped by the politics of Eisenhower's space for peaceful purposes policy. Dyna-Soar, as a *manned* orbital reconnaissance system, could be trumped by the economics of AFBMD's unmanned satellite alternatives. Although moving forward, as of April 1960, the future of the Air Force's aerospace platform was headed toward tenuous ground.

Between December 1958 and December 1960, actions within the Air Force's purview, with respect to resource expenditures and organizational structure, had offered little support to the aerospace concept's institutionalization. Dyna-Soar floundered in

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[230] Geiger, "Strangled Infant," 237-8.

[231] Houchin, 237.

[232] Carl Berger, *The Air Force in Space: Fiscal Year 1961,* April 1966, USAF Historical Division Liaison Office, Jeffrey Richelson, ed. *Military Uses of Space, 1945-1991,* Washington, D.C.: NSA, 1991, No. 00323, Microfiche, 51.

organizational terrain that offered little in the way of advocacy support or top cover. Meanwhile, systems that embodied a space-only character fared better under the focused care of a division oriented increasingly on space and only space. Effectively, then, the Air Force's R&D community had evolved into one that was promoting an air and space, rather than an aerospace perspective. Moreover, this countervailing trend was being affirmed by the Air Force's external environment. Beyond this particular section of the Air Force, however, the aerospace concept had flourished.

During the last two years of the Eisenhower presidency, the concept's reach within the Air Force expanded enormously. With a single word as the vehicle, focused senior leadership as the empowering engine, and air power theory as the justifying fuel, the notion that air and space are a single continuum had been driven into all corners of the organization. So effective was the effort that in just two years the idea moved from one that circulated only within the Air Force's headquarters and in particular pockets of its R&D community, to one that rang familiar among airmen across all ranks and files. It had also acquired staying power, captured in Air Force publications, slogans, and even its basic doctrine manual. Indeed, the concept had moved out beyond the Air Force's walls as well.

There, however, aerospace ran into a deliberately chosen counter perspective. At the same time the Air Force view of the vertical realm was proliferating within its own walls, the wedge that Eisenhower had set between air and space was being driven into place through measured steps designed to give his vision for America's future in space a fair chance to survive beyond his presidency.

EISENHOWER SECURES A SPACE LEGACY

Space, while not atop the administration's priority list during the final two years of the Eisenhower presidency, still garnered a share of the president's attention. As his time in office wound down, Eisenhower continued to nourish the two vectors of the space program that he had cast into the political landscape during the months that followed *Sputnik*. One, keeping outer space free and peaceful, hewed an increasingly visible path. The other, maintaining an ability to spy there from, moved even deeper into secrecy. As was discussed in the last chapter, however, these two paths continued to reinforce each other, and the effectiveness of each remained dependent upon the administration advocating the perspective that space was separate and distinct from the atmosphere.

Consequently, the president's space strategy—both its visible and hidden aspects—influenced the aerospace concept's institutionalization within the Air Force. When enacted, it reached beyond policy-driven perspectives and into legal, organizational, and budgetary realms. Furthermore, as this strategy matured, it began to shape the international security context as well. In other words, while the Air Force was pushing an aerospace perspective on its own within, everywhere else air and space was the worldview gaining purchase and edifying.

EISENHOWER'S VISIBLE PATH

The portion of Eisenhower's space strategy visible to the public was discernable in the administration's actions and decisions. The source of this activity, however, was the president's national space policy, which he put through a top-to-bottom revision prior to entering his final year in office. The document itself thus provides an excellent summary perspective of Eisenhower's vision and intent. Indeed, it stands as a key piece of his legacy to America's space program.

Solidifying a Space Policy. On 30 June 1959, still inside a year from the release of NSC 5814/1, but with the end of his presidency beginning to loom, Eisenhower approved an ad hoc committee, made up of both NSC and National Aeronautics and Space Council (NASC) members, to strengthen and expand his original space policy document. The committee labored over the next six months refining Eisenhower's codified vision for America's space program. Their product, which finally secured the president's signature on 26 January 1960, would be Eisenhower's last policy imprint with respect to space.[233]

From the perspective of this study, three different aspects of the "National Aeronautics and Space Council, 'U.S. Policy on Outer Space,' January 26, 1960" are significant.[234] Most importantly, the new policy continued to reinforce the ideational separation of air and space as a critical piece of America's Cold War security strategy. Second, it buttressed the organizational structures that embodied and perpetuated that separation. Finally, it outlined a plan to project more firmly the distinction into the international realm.

The air/space divide was maintained—indeed strengthened—by Eisenhower's continued adherence to two related positions. "Space for peaceful purposes" remained the policy's central theme. Recognizing that the "[c]ontinuation and extension of such cooperation in the peaceful uses of outer space… should further enhance the position of the United States," the president's revised policy directed his analysts to

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[233] Rosenberg, 3.

[234] Some refer to this document as NSC 5918, which maintains a consistent nomenclature with the space policy that preceded it. NSC 5918 was, in fact, the document's title while it circulated as a draft. However, upon approval, the policy paper took on its official name noted here.

> [s]tudy the scope of control and character of safeguards required in an international system designed to assure that outer space be used for peaceful purposes only; include in this study an assessment of the technical feasibility or a positive enforcement system and an examination of the possibility of multilateral or international control of all outer space activities.[235]

Atop his peaceful purposes foundation, Eisenhower also reintroduced tentative support to pursue broader international acceptance of the principle of "freedom of space." The administration had expressed this goal almost five years earlier in NSC 5520, but had conspicuously left the discussion out of NSC 5814/1's language. Within the new document, however, support for "freedom of space" reemerged.

> Although the U.S. has not to date recognized any upper limit to its sovereignty, a principle of freedom of outer space… suggests that at least insofar as peaceful exploration and use of outer space are concerned, the right of states to exclude persons and objects may not obtain. …[Thus America will] continue to support the principle that, insofar as peaceful exploration and use of outer space are concerned, outer space is freely available for exploration and use by all.[236]

A national policy advocating as it did both space for peaceful purposes and freedom of space made it an imperative that space be considered a distinct and separate place.

NSC 5814/1 had been explicit in its simple delineation between "air space" and "outer space," however, the revision, acknowledging the difficulty in establishing clear and concise delineation between the two, opted for a more ambiguous, but politically realizable tack. "Although an avowedly arbitrary definition might prove useful for specific purposes, most of the currently foreseeable legal problems of outer space may be resolved *without* a precise line of demarcation between air space and outer space."[237]

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[235] National Aeronautics and Space Council, "U.S. Policy on Outer Space," 26 January 1960, in John M. Logsdon, ed., *Exploring the Unknown: Selected Documents in the History of the U.S. Space Program* Vol. I: *Organizing for Exploration* (Washington D.C.: NASA History Office, 1995), 367-8.

[236] "U.S. Policy on Outer Space," 26 January 1960, 366, 368.

[237] "U.S. Policy on Outer Space," 26 January 1960, 365. Emphasis mine.

Propagating a policy that advocated space was a different place and embraced the idea irrespective of the legal specifics the position might someday entail, was an important step in making differentiation so. So too were the policy's directives to fortify the organizational structures that would not only perpetuate the air/space divide, but would also insure that America's future space activities maintained their civilian character.

Under the president's wing, steadily and dramatically NASA had acquired organizational momentum over its fifteen-month existence. Indeed, only three months before releasing his last space policy, Eisenhower had added a significant exclamation point to the agency's development and the space program's civilian flavor as a whole. He pried the 1.5 million pound Saturn booster program out of the Army's hands (along with and the von Braun-led team running it) and turned it over to NASA.[238] The move left the Defense Department without a current or projected heavy lifter program, and consequently, little capacity to execute an extended manned space-flight program on their own. NASA's recent acquisition coupled now with this statement from the president's new space policy…

> [M]anned spaceflight and exploration will represent the true conquest of outer space and hence the ultimate goal of space activities. No unmanned experiment can substitute for manned space exploration in its psychological effect on the peoples of the world. …[Thus America], starting with the recovery from orbit of a manned satellite, [will] proceed as soon as reasonably practicable with manned space flight and exploration.[239]

…made Eisenhower's vision unmistakable: the nation's astronauts should wear a civilian face, not military one.

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[238] Rosenberg, 16.

[239] "U.S. Policy on Outer Space," 26 January 1960, 363, 368.

Moreover, the new policy aimed to support this vision with funding. Projected budget outlays, published in an annex to the document, pushed NASA's FY 1960 space allocation of $524 million ahead, for the first time, of DoD's $438.8 million figure. Furthermore, NASA's FY 1961 numbers were swelled an additional sixty percent, and were projected to reach $1.35 billion by FY 1964. DoD's, in comparison, was forecast at only ten percent growth for 1961 and would reach just $728 million by the 1964 point.[240] In other words, the president's final policy envisioned his flagship civilian space agency, an organization barely a year old, as being responsible within four years for roughly two-thirds of the nation's space program and leading its manned space flight effort. The military's space faring functions, on the other hand, would be limited by the policy to unmanned, defense-support functions.[241]

The third significance of Eisenhower's 1960 U.S. Policy on Outer Space, where this study is concerned, was its determined intent to project the president's vision into the international arena.

> [T]he establishment of sound international relationships in this new field [of outer space] is of fundamental significance to the national security. …[A]n improvement of the international position of the U.S. may be effected through U.S. leadership in extending internationally the benefits of the peaceful purposes of outer space.[242]

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[240] "U.S. Policy on Outer Space," 26 January 1960, 372. In retrospect, NASA did not surpass the Defense Department in actual expenditures until FY 1961.

[241] "U.S. Policy on Outer Space," 26 January 1960, 364-5. See also R. Cargill Hall, "Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program,* vol. I, *Organizing for Exploration,* ed. John M. Logsdon (Washington, D.C.: NASA History Office, 1995), 229. These functions specifically were meteorology, communications, and navigation. A portion of this section of the policy remains classified, however historical context and retrospect implies that early warning and strategic reconnaissance are likely the functions excised in the declassification review.

[242] "U.S. Policy on Outer Space," 26 January 1960, 363.

To achieve this, the president called on his administration to continue building "arrangements within the framework of the international scientific community," as well as "bilateral and multilateral arrangements between the U.S. and other countries including the Soviet Union."[243] He also saw the UN as an important broker in achieving these goals. His policy urged U.S.

> [s]upport [of] the United Nations in facilitating international cooperation in the exploration and use of outer space and in serving as a forum for consultation and agreement respecting international problems arising from outer space activities.[244]

Specifically, Eisenhower listed issues for the international body to seek agreement on—issues which set forth the early blueprint of an international legal regime for outer space. Among them, identification and registration of space vehicles, injury liability for damage caused by the same, radio frequency spectrum management, traffic management and collision avoidance procedures, and the return of spacecraft upon landing on the territory of other nations would emerge by end of 1963 as approved UN General Assembly resolutions.[245]

In sum, Eisenhower's final and most comprehensive policy statement on space did exactly what Edwin Land had prescribed in his Land Panel Report back in February 1955 that it should do; the policy reiterated a national intent to erect a political divide between air and space. Furthermore, it provided funds for the governmental organization that would sustain this divide. In short, it tore the Air Force's aerospace concept in two. Moreover, the policy moved more strongly than ever before to push its principles internationally. Indeed, as its final edits were being made, the particular avenue through

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[243] "U.S. Policy on Outer Space," 26 January 1960, 368.

[244] "U.S. Policy on Outer Space," 26 January 1960, 368.

which these principles would acquire global traction was moving toward a state of permanence.

A Flicker of UN Support. The UN's Committee on the Peaceful Uses of Outer Space (COPUOS), as of December 1959, had been an ad hoc entity for a year. During the first six months thereof, it had published a preliminary report that advocated much of America's broad peaceful purposes position regarding space, and suggested modest managerial functions the UN might pursue to facilitate that position.[246] Thereafter, the committee focused on drafting a resolution to make itself a permanent entity.

On 12 December, UNGA Resolution 1472 (XIV), passed unanimously through the General Assembly. "Recognizing the common interests of mankind as a whole… [and] the great importance of international cooperation in the exploration and exploitation of outer space for peaceful purposes," the resolution bid COPUOS to examine possible space programs that would be appropriate for the UN to establish and manage. It also directed the committee to expand its scope "to study the nature of legal problems which may arise from the exploration of outer space."[247] Because the membership of the 24-nation committee mirrored the Cold War balance of power, it struggled to accomplish anything during the first two years of its existence.[248] However, its very creation established a permanent organizational structure within the UN through which the future

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[245] "U.S. Policy on Outer Space," 26 January 1960, 368.

[246] Matthew J. Von Bencke, *The Politics of Space: A History of U.S. – Soviet/Russian Competition and Cooperation in Space* (Boulder: Westview Press, 1997), 43.

[247] UNGA Resolution 1472 (XIV), International co-operation in the peaceful uses of outer space, 12 December 1959 (accessed 30 Dec 2002); available from http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_14_1472.html.

[248] Don E. Kash, *The Politics of Space Cooperation* (West Lafayette, IN: Purdue University Studies, 1967), 107.

international space regime would eventually emerge. Though this regime was still years away from materializing, its character and shape would be one that Eisenhower had largely prescribed. Finally, through COPUOS, the notion of space for peaceful purposes—and by implication, space as a different place—continued to gain international and increasingly public traction.

As he closed out his presidency, major aspects of Eisenhower's space strategy were by design visible to the public's eye. His policy of space for peaceful purposes was the most obvious element and one where he had succeeded, to a respectable degree, in moving beyond the nation's borders. The second visible piece—the creation, separation, and elevation of a civil space agency above the military—provided tangible structure and legitimacy to support his peaceful purposes policy. Finally, and most importantly from the standpoint of this study, Eisenhower was able to establish a perspective, born out of a strategic political choice, that held space distinct from air. All of these aspects strengthened and solidified during the closing two years of his term.

Another crucial part of his program, however, was far removed from the public eye. Indeed, it was indiscernible to all but a very select few within his administration. It too developed further during this period, and it too had a discouraging influence on the aerospace concept's progress.

EISENHOWER'S HIDDEN PATH

Eisenhower faced the increasing likelihood of a strategic reconnaissance shortfall ever since his advisors warned him of its potential during the weeks that followed *Sputnik*. Since then, while the Soviets bit by bit extended the reach and accuracy of their air defenses, progress on the CORONA program—created under deep secrecy to replace the U-2 as quickly as possible—had been painstakingly slow. Covered in its "Discoverer" guise, the program's first launch attempt in January 1959 ended in flames on the launch pad. Over the next sixteen months, eleven more were attempted, and each one, for a myriad of different reasons, met failure.[249] Additionally, the Air Force's SAMOS program, as described earlier, had also struggled. Technical and mismanagement problems slipped its development timeline and frustrations had percolated upward within the administration.[250]

Meanwhile, in the spring of 1960, to prepare for May's much-anticipated Paris Summit, Eisenhower turned once again to his airborne perch. Despite mounting indications that the Soviets had finally developed a surface to air missile capable of threatening his high-altitude spy planes, the president approved yet another set of U-2 flights over the Soviet landmass.[251] And as has often been the case in this study, once again a Cold War crisis, though dear in its immediate costs, furnished the stimuli for a series of events in its aftermath that had long-lasting consequences.

The U-2 Shootdown. Khrushchev had this to say about the twenty-four top secret U-2 flights that Eisenhower, since the summer of 1956, had sent into Soviet airspace:

> [Each was] an especially arrogant violation of our sovereignty. We were sick and tired of these unpleasant surprises, sick and tired of being

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[249] Tina D. Thompson, ed. *Space Log 1996* Vol. 32 (Redondo Beach, California: TRW, 1997), 66-7. Data extracted from table. Through all these disappointments, Eisenhower remained resilient and steadfast. White House Staff Secretary General Andrew J. Goodpaster, remarked later that the president often said: "Let's not worry about it. Let's stay with it. It's so important, and we need it. We need to just keep going with it." (As quoted in Philip Taubman, *Secret Empire: Eisenhower, the CIA, and the Hidden Story of America's Space Espionage* (New York, NY: Simon & Schuster, 2003), 289-90. Pages 270-324 detail this story well.)

[250] Stares, 45, and George B. Kistiakowsky, *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology* (Cambridge: Harvard University Press, 1976), 45, 192.

[251] Taubman, 299.

> subjected to these unpleasant indignities. They were making these flights to show up our impotence. Well, we weren't impotent any longer.[252]

On May Day in 1960, a brand new SA-2 surface to air missile quietly reached up into the sky and ripped down the last of these "indignities," and with a single swipe, expanded the defendable limit of Russia's sovereign domain. As had long been predicted, the world soon heard all about it.

The public's first inkling of the event actually came from an official statement released by NASA on Thursday, May 5th.

> One of NASA's U-2 Research Airplanes, in use since 1956 in a continuing program to study gust-meteorological conditions found at high altitude, has been missing since about 9 o'clock Sunday morning, (local time) when its pilot reported he was having oxygen difficulties over the Lack Van, Turkey area.[253]

The story seemed plausible enough, even juxtaposed in the following morning's newspapers under a headline reading "Soviet Downs American Plane" and beside Khrushchev rants over America's "aggressive acts against our country," violations "of our state frontier," and intrusions "into the airspace of the Soviet Union."[254]

But Saturday afternoon, nearly a week after the shootdown, Khrushchev made a dramatic appearance before his politburo. Holding up a high-altitude photograph of a Soviet bomber base, apparently taken by NASA's "weather plane," the Soviet Premier announced they had captured the plane's pilot, that he was alive, and that he had

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[252] Nikita Khrushchev, *Khrushchev Remembers: The Last Testament,* (Boston: Little, Brown, 1974), 444. As cited in Taubman, 306.

[253] "National Aeronautics and Space Administration Press Release on Missing U.S. Plane," 5 May 1960, Eisenhower Archives, 1 (accessed 25 February 2005); available from http://www.eisenhower.archives.gov/dl/U2Incident/NASAPressRelease5560page1.pdf. Also reported in "Text of U.S. Statement on Plane," *New York Times,* 6 May 1960, 7.

[254] "Khrushchev's Remarks on U.S. Plane," *New York Times,* 6 May 1960, 7.

confessed his role as an airborne spy. America's explanation for its misplaced U-2 crumbled instantly. Project Aquatone was finished.

For Eisenhower, and with the Paris Summit only a week away, the political costs were as dear as his humiliation was deep. Many, even from the non-Communist bloc, openly blamed the U.S. for its "reckless action, for not governing the activities of its own intelligence officers and for neglecting to tell the truth at first when the plane was shot down."[255] Worse, Khrushchev, instead of canceling the Paris talks in ire, opted to attend anyway, and used the stage to ratchet up Cold War tension.

At the summit's opening remarks, the Soviet premier immediately departed from the scheduled discussion and instead served his rival public notice. Before any further negotiations could occur, Khrushchev demanded that Eisenhower repudiate and renounce America's aerial incursions into Soviet territory "as 'provocative' and 'aggressive,' apologize for them to Soviet Russia and punish those responsible."[256] The American president rejected the demand out of hand, but with the summit's tone now set, little was accomplished over the ensuing four days. The Cold War moved into one of its icier periods. Years later, presidential science advisor George Kistiakowsky[257] reflected on a private conversation he had with the president shortly thereafter. Eisenhower spoke "with much feeling about how he had concentrated his efforts the last few years on ending the cold war, how he felt that he was making big progress, and how the stupid U-2

[255] James Reston, "Flights Stopped," *New York Times,* 9 May 1960, 1.

[256] "Crisis at the Summit," *New York Times,* 17 May 1960, 36.

[257] Kistiakowsky replaced James Killian in this post the summer previously, on 15 July 1959.

mess had ruined all his efforts."[258] But from the mound of the Paris Summit's adversity also came the kernel of an opportunity.

Eisenhower had noticed the Soviet Premier discussing the U-2 issue with French President Charles de Gaulle. In the discourse, the French leader remarked that the Soviets sent a satellite over France daily and had probably also taken photographs. At that point, "Khrushchev broke in to say he was talking about airplanes, not satellites. He said any nation in the world who wanted to photograph Soviet areas by satellite was completely free to do so."[259] The comment was likely an unguarded one—in two years time, the Soviets would launch an all out diplomatic offensive to outlaw U.S. "espionage" satellites.[260] But in May of 1960, Khrushchev's offhand remark no doubt influenced the American president by providing a measure of impetus behind the action he took immediately upon his return from Europe.

Sequestering Strategic Reconnaissance. White House Science Advisor George Kistiakowski noted in his diary on 19 May—the day of the president's return from Paris—that "the whole intelligence business is in chaos… namely various satellite development projects, the lack of control of the military requirements, poor program management and their wild proliferation."[261] With the loss of his secret perch over the Soviet Union, but likely encouraged by Khrushchev's offhand remarks to de Gaulle,

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[258] Kistiakowsky, 375.

[259] Dwight D. Eisenhower, *Waging Peace: The White House Years, 1956-1961* (Garden City, NY: Doubleday & Company, Inc., 1965), 556. See also Kistiakowsky, 334.

[260] Stares, 57, 69.

[261] Kistiakowsky, 331.

Eisenhower, on 26 May 1960, directed Defense Secretary Thomas S. Gates to conduct a thorough review of America's spy satellite efforts.[262]

Gates selected Kistiakowski to chair the committee. He in turn enlisted the help of Joseph V. Charyk (Air Force Undersecretary) and York (DDR&E) from the Defense Department. He also called on his predecessor, James Killian, as well as Edwin Land, both of TCP fame.[263] The scope of their effort was threefold: to examine satellite system developments, to assess their likelihood to meet national intelligence requirements, and to recommend any organizational or operational improvements.[264] The committee met through the summer and presented its findings to Eisenhower at a National Security Council meeting on 24 August 1960, a meeting that would have historical ramifications, particularly where this study is concerned. However, two key events that occurred in the days leading up to this meeting conditioned its outcome considerably.

Two weeks prior, the CIA issued a National Intelligence Estimate urging a stricter secrecy policy with respect to the nation's reconnaissance satellite systems. Only a handful of people in the entire nation knew anything at all about CORONA, but the Air Force had felt little pressure to hide the existence of its SAMOS program. Details remained classified as a standard practice, but general information, such as its anticipated mission or its development timeline had often been a matter of public record. Indeed, in the aftermath of the U-2 shootdown, such public discourse tended to serve the service's

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[262] Stares, 45.

[263] R. Cargill Hall, "The Eisenhower Administration and the Cold War: Framing American Astronautics to Serve National Security," *Prologue: Quarterly of the National Archives* 27, no. 1 (Spring 1995): 67. See also Peter L. Hays, "Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War" (Ph.D. diss., The Fletcher School of Law and Diplomacy, May 1994), 180, and William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998), 238.

[264] Hall, "The Eisenhower Administration," 67.

interests well. In mid-June, for example, a Senate vote to increase the program's funding by $84 million made the front page of *The New York Times.* "Samos," the article explained, was a "spy satellite …expected to be ready in three or four years" but was now more "urgently needed since the cessation of U-2 spy-plane flights over the Soviet Union."[265]

In light of such publicity, and reflecting on Soviet behavior over May's U-2 incident, CIA analysts concluded that beyond alerting the Soviet Union of the nation's developing ability to monitor them, any proclaimed advancements in space reconnaissance satellites of any kind would likely be interpreted by the Russians as a blow to their prestige and could illicit provocative behavior. Thus, the analysis reasoned,

> …if the US Government refrained from officially avowing and attempting to justify a reconnaissance program, and perhaps explained the launching of new satellites on other grounds such as scientific research, we believe that the chances are better than even that the Soviets would not press the issue until they were able either to destroy a vehicle, or to establish its mission by authoritative US acknowledgement or other convincing proof.[266]

In essence, the CIA was recommending a policy to manage the informational aspects of all reconnaissance satellites in the same way, and for identical reasons, as the Aquatone project had been. Meanwhile, as the CIA paper circulated around government, a second key event occurred: CORONA, as Discoverer, finally discovered success.

On 18 August 1960, at 12:57 P.M. California time, *Discoverer 14* lifted off from its Vandenburg Air Force Base launch pad and entered an orbit over the earth's poles. After seventeen trips around the globe, the satellite ejected a 20-pound canister that reentered

[265] "Senate Unit Raises Spy-Satellite Fund," *New York Times,* 11 June 1960, 1.

[266] "Probable Reactions to U.S. Reconnaissance Satellite Programs," Special National Intelligence Estimate, No. 100-6-60, 1-2. As cited in Burrows, 236.

the atmosphere above the Pacific, descended under parachute, and was plucked out of the sky by a waiting Air Force C-119.[267] The canister contained film that exposed 1,650,000 square miles of Soviet territory including such gems as the Kapustin Yar Missile Test range, portions of its downrange impact area, sixty-four airfields, and twenty-six new surface-to-air missile sites.[268] This was the mother lode. CORONA's first successful satellite reconnaissance mission had turned up more intelligence than four years of Aquatone missions—twenty-four in all—combined.[269]

Six days later, and fifteen minutes before the historic NSC meeting, Eisenhower first saw the trove in his Oval Office. Kistiakowski, Killian, and Land met the president early, brought in the film and rolled it out across the carpet. He declared on the spot that no pictures would ever be released to the public.[270] So primed, the four men then walked together into their 8:30 meeting convened to discuss the results of Kistiakowski's summer-long spy satellite review.

Therein, the White House Science Advisor argued that reconnaissance satellites were crucial to the nation's security. As such, they were vital national, not just military, resources and, for the reasons outlined in the CIA recent national intelligence estimate, resources best managed in strict secrecy. His review had also found the Air Force's

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[267] Curtis Peebles, *The Corona Project: America's First Spy Satellites* (Annapolis, MD: Naval Institute Press, 1997), 88-90.

[268] Peebles, 88-90, and Burrows, 234.

[269] Peebles, 91.

[270] Hall, "The Eisenhower Administration," 68. See also Kistiakowsky, 387, Burrows, 234, and Peebles, 95. Burrows notes the statesmanlike quality of this Eisenhower decision. CORONA would very soon prove conclusively that the missile gap—a major issue pressed by Kennedy in the ongoing presidential campaign—was in fact a myth. The future president would concede this fact just days after being sworn in when he would have access to the same top-secret intelligence that his predecessor had. See Burrows, 234.

SAMOS program in technical and organizational disarray.[271] The committee's recommendation to the NSC was therefore to consolidate all reconnaissance satellite systems under a single and clear line of civilian authority outside of the military, and "that on the top level, the direction [should] be of a national character, including OSD and CIA and not the Air Force alone."[272] They proposed that an office be established with a director who would report directly to the Secretary of Defense. Military officers at the project level would no longer answer to their military authorities, rather they would report directly to the program's civilian leadership. In other words, the review panel's recommendation and intent was to cut Air Force senior management out of the reconnaissance satellite loop once and for all.[273]

Eisenhower approved every single recommendation the panel brought forward. Key to him was the office's national-level character—he "wanted to make damn sure" that the Air Force would not control it.[274] Defense Secretary Gates voiced no issues. And thus it was so. Five days later, the Office of Missile and Satellite Systems (OMSS) was established as a cover to manage more closely and more quietly the nation's strategic reconnaissance satellite capabilities. Air Force Undersecretary Joseph Charyk was named its director, and the SAMOS program, like its forerunner sibling CORONA, suddenly disappeared from the Air Force's books.[275] "The only unfortunate thing," the

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[271] Hall, "The Eisenhower Administration," 67-8.

[272] Kistiakowsky, 382.

[273] Kistiakowsky, 387. See also Hall, "The Eisenhower Administration," 68, and Burrows, 238.

[274] Jeffery T. Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program,* (New York, NY: Harper & Row, 1990), 46, and Hays, 181.

[275] Piper, 19.

president had said to Kistiakowski as the historic NSC meeting closed, "was that we didn't make these recommendations two years ago."[276]

Thus, three months prior to the presidential election, but seen by only a select few, Eisenhower affected the solidification of another edifice in his national space program. Complementing its public aspects, the president created the framework for a civilian-led organization to administer and control the nation's orbital reconnaissance assets, nearly completing a migration begun in November 1954. Then, the Air Force yielded its airborne strategic reconnaissance mission; now it was being forced to relinquish its space-borne reconnaissance aspirations as well. In a year's time, the OMSS would become the National Reconnaissance Office (NRO)—an organization that would come to draw heavily from the Air Force work force for expertise and support, but would operate largely independent and well out from under America's "aerospace" arm.

EISENHOWER'S FINAL SPACE ACT

Eisenhower's hand in sculpting the world's perspective on space cast its final impressions through an opportunity that arose on 22 September 1960 during the opening of the UN General Assembly's fifteenth session. The event developed into an impromptu "summit" after Khrushchev surprisingly announced earlier in the month that he would lead the Soviet delegation to New York. Soon thereafter, leaders from all over the world also made plans to attend in a mounting hope that the meeting would offer the first tangible opportunity for superpower reconciliation since the Powers incident.[277]

[276] Kistiakowsky, 387.

[277] Eisenhower, *Waging Peace,* 576-8.

Eisenhower opened the event with sweeping and substantive speech that spanned arms control, African development, and a ringing "endorsement of the UN [that] was the warmest and strongest he had ever delivered."[278] He also used the opportunity to address space.

> [W]ill outer space be preserved for peaceful use and developed for the benefit of all mankind? Or will it become another focus for the arms race…? The choice is urgent. And it is ours to make.
>
> …I propose that:
>
> We agree that celestial bodies are not subject to national appropriation by any claims of sovereignty.
>
> We agree that the nations of the world shall not engage in warlike activities on these bodies.
>
> We agree, subject to appropriate verification, that no nation will put into orbit or station in outer space weapons of mass destruction. All launchings of space craft should be verified in advance by the United Nations.
>
> We press forward with a program of international cooperation for constructive peaceful uses of outer space under the United Nations. Better weather forecasting, improved world-wide communications, and more effective exploration not only of outer space but of our own earth—these are but a few benefits of such cooperation
>
> Agreement on these proposals would enable future generations to find peaceful and scientific progress, not another fearful dimension to the arms race, as they explore the universe.[279]

This was Eisenhower's last major foreign policy speech. In it, he cast feelers, made initial offerings, and planted suggestions. "I propose that we agree,…" he said. Although nothing substantive came of his gesture, he made his last public statement on

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[278] "The News of the Week in Review," *New York Times,* 25 Sep 1960, E1.

[279] Senate Committee on Aeronautical and Space Sciences, 1971, Statements *by Presidents of the United States on International Cooperation in Space, A Chronology: October 1957-August 1971* (Washington, D.C.: US GPO, 1971), 16-7.

the subject of space before the entire world, and in so doing, he forged a trail down which his predecessor could later proceed.

During the final two years of the Eisenhower presidency, the aerospace concept penetrated more deeply into the Air Force's organizational consciousness than it ever had before. Grounded in air power theory, championed by General White and anchored securely within the air staff, the idea spread from there throughout the breadth and depth of the service, and moved considerably beyond its walls as well.

Challenging this ideational development from within, however, was a contrary perspective ascending from the R&D realm of the Air Force. Under the leadership of Lieutenant General Bernard Schriever, whose worldview was clearly not aligned with White's, this community was organizing itself in a manner that propagated the notion that air and space were separate places. Within such a structural arrangement, space-enabling technologies fit this organizational mold, garnered advocacy, and consequently fared much better than Air Force's aerospace-enabling program; specifically, satellites and rockets prospered, while Dyna-Soar languished.

Importantly, although a natural tension was developing within the Air Force between these two paradigms, each advocated identical ends where the service's relationship with its external environment was concerned—Air Force possession of the military role in the nation's space program. The significant difference between them was that White's aerospace concept was more attuned to the service's foundational theory, while Schriever's air and space perspective was more attuned to the service's environmental reality, which by January 1961 Eisenhower had largely succeeded in solidifying.

As Dwight D. Eisenhower stepped down from office, the goal of a free and peaceful outer space was a codified national policy position that had gained momentum as an aspiring ideal within the international community as well. Reinforcing his policy stance, the president had deliberately partitioned the nation's space program into its civilian and its military endeavors, and had successfully limited the latter to non-aggressive support activities. Eisenhower affected this division by ensuring that NASA remained preeminent and acquired increasing organizational clout, and by dictating in deep secret that the nation's satellite reconnaissance capabilities remain outside of the Air Force's sphere of control.

That said, Eisenhower had only cast a die. A new president, elected in part on a platform that advanced a much stronger military role in space, and bringing into office a vastly different administration, stood wholly capable of upending part or all of what the general-turned-statesman had erected around space during his eight years in office. Such being the case, the aerospace concept's institutional viability remained an unsettled condition.

Chapter 7

A Concept Checked
(Institutionalization Arrested, 1961-63)

When Kennedy assumed office in January 1961, little was impelling him to adopt his predecessor's policies, particularly where space was concerned. The new president could have eschewed the paths that Eisenhower forged, and to some extent had been elected on a platform pledging to do exactly that. Thus, in early 1961, airmen hopeful for a stronger Air Force role in space saw an encouraging future. And in that optimism, the aerospace concept still carried institutional momentum.

Within eight months, however, White retired and Kennedy reneged. These two events frame a series of others throughout the Kennedy presidency, all of which established conditions internal and external to the Air Force that checked the aerospace concept's further penetration within the service. Moreover, as these conditions solidified, they arrested the concept's institutional development for good. In other words, the state in which the aerospace concept found itself within the Air Force in December 1963, largely describes the state in which it has remained since. As such, the conclusion of the Kennedy presidency effectively marks the conclusion of the aerospace concept's institutional development as well.

The first of this chapter's three sections examines developments internal to the Air Force during the eight months between Kennedy's election and General White's retirement. The second steps outside the Air Force and explores how the Kennedy administration in fact came to fully embrace Eisenhower's dual-path approach to space and thereafter propel it from national policy into international practice. The chapter's final section returns to the Air Force perspective to describe the resulting organizational conditions that affect the permanent suspension of the aerospace concept's penetration.

AIR FORCE MOVES TOWARD SPACE

Between President Kennedy's election in November 1960, and General White's retirement on 30 June 1961, organizational changes occurred within the Air Force that had a stemming effect on the aerospace concept's institutionalization potential. An administration initially warm to greater military involvement in space created the restructuring opportunity Schriever had been campaigning for since the summer before, and another Soviet spectacular—sending the first man into space—opened avenues for Air Force leaders to engage in national-level policy-shaping. These actions, coupled with the aerospace concept's strongest advocate stepping aside in the summer, initiated a subtle perspective shift within the Air Force that became more visible in the years that followed. The aerospace concept found itself yielding ground within the Air Force to an increasingly apparent air and space point of view.

HOPEFUL BEGINNINGS

Where the Air Force's future beyond the atmosphere was concerned, as the 1960 presidential campaign unfolded, it was obvious that the service's prospects looked significantly better under a Kennedy administration than a Nixon one. Nixon's campaign could never shake free of the status quo label. Kennedy's, meanwhile, hammered relentlessly on the "missile gap." The United States was "rapidly approaching that dangerous period," he said from the Senate floor in August, "in which our own offensive and defensive missile capabilities will lag so far behind those of the Soviets as to place us in a position of great peril."[1] In the midst of a cold war still frozen from the Paris Summit, Kennedy's implicit argument—that Republicans had squandered the nation's security—found traction.[2]

It also had utility. The "missile gap" thread tied naturally into a space and national security argument. As noted in the previous chapter, the Massachusetts senator began to advocate a stronger military role in the nation's space program. Freedom of space must be ensured, he had said, before peaceful space can be realized. Moreover, national pride was at stake. Indeed, Kennedy's campaign purposefully intertwined these things that Eisenhower had sought throughout his administration to keep separate. "The world's first satellite," the challenger chided at various stops along his campaign trail,

> was called a Sputnik, not Vanguard or Explorer. The first living creatures to orbit the earth were Strelka and Belka, not Rover and Fido. Now let me make it clear that I believe there can be only one defense policy for the United States, and that is summed up in the word "first." I do not mean "first, but." I do not mean "first, when." I do not mean "first, if." I mean first period.[3]

Such rhetoric no doubt resonated within the Air Force.

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[1] Kennedy, remarks in the Senate, as quoted in Mark A. Erickson, "The Evolution of the NASA – DoD Relationship from Sputnik to the Lunar Landing" (Ph.D. diss., Columbian School of Arts and Sciences of The George Washington University, 18 May 1997), 259.

[2] The missile gap strategy was crafted by Kennedy campaign advisor Walt Rostow in January 1960. See Walter A. McDougall, *…the Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985; Baltimore: The Johns Hopkins University Press, 1997), 218-9.

[3] Kennedy speech before a VFW convention in August 1960, as quoted in Erickson, 260. An iteration of this same refrain appeared in print in John F. Kennedy, Senator, "If the Soviets Control Space, They Can Control the Earth," *Missiles and Rockets* (10 October 1960): 12.

Ironically, while Kennedy was leveraging the missile gap, CORONA satellites were confirming the gap was a myth. But a myth, decided Eisenhower, which he could share only with an incoming president, not a prospective one.[4] Meanwhile, the public's belief in America's ICBM shortfall only strengthened the influence of Kennedy's defense-targeted campaign strategy.

Following the Kennedy victory on 8 November, Air Force hopes brightened still further. The president-elect asked MIT President Dr. Jerome B. Wiesner "to provide a survey of the [national space] program and to identify personnel, technical, or administrative problems which require the prompt attention of the Kennedy administration."[5] Wiesner in turn gathered a nine-man team that included Trevor Gardner and Edwin Land, both of whom, along with Wiesner, were serving together on Gardner's Air Force Space Study team that General Schriever assembled the month prior.[6] This gave the Air Force an inside line on the Wiesner Committee's deliberations. Indeed Schriever said later that there had been "complete interaction" between the two groups, interaction that would soon yield the service significant rewards.[7]

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[4] Jeffery T. Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York, NY: Harper & Row, 1990), 58; William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998), 234.

[5] David N. Spires, *Beyond Horizons: A Half Century of Air Force Space Leadership* (Peterson AFB, CO: Air Force Space Command, Spring 1995), 86; "Report to the President-Elect of the Ad Hoc Committee on Space, Classified Version," 10 January 1961, declassified 13 December 2002, 168.7171-137, IRIS No. 1040285, in USAF Collection, Air Force Historical Research Agency, Maxwell AFB, AL (hereafter, USAF AFHRA), 3.

[6] John. M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, MA: The MIT Press, 1970), 73-4; Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-84* (Ithaca, NY: Cornell University Press, 1985), 60.

[7] Interview with Bernard Schriever, 3 November 1967, as quoted in Logsdon, *Decision,* 74.

Wiesner submitted his report on 10 January 1961, the day before Kennedy appointed him his Special Assistant for Science and Technology.[8] Since, scholars have generally concluded its influence was minimal.[9] The report was largely non-committal on a variety of issues and offered Kennedy little substance in the way of concrete policy direction. In one respect, however, from the perspective of this study, it left an enormous imprint.

The second of its five summary recommendations advised the new president to set up "a single responsibility within the military establishments for managing the military portion of the space program."[10] The Wiesner team saw "an urgent need to establish more effective management and coordination of the United States space effort." It criticized "the fractionated military space program" as being inadequate "to meet the challenge that the Soviet thrust into space has posed to our military security and to our position in the leadership of the world."[11] Specifically, the committee recommended that "the responsibility of all military space developments …be assigned to one agency or military service within the Department of Defense, [so that] the Secretary of Defense would then be able to maintain control of the scope and direction of the program."[12] A month after taking office, when the new administration acted upon this advice, the Air Force was no doubt prepared.

OPPORTUNITY KNOCKS

In late February, the new Deputy Secretary of Defense, Roswell L. Gilpatric, quietly tendered a lucrative offer. The Defense Department would give the military space

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[8] McDougall, 309.

[9] See Logsdon, *Decision,* 71-5, or McDougall, 309, 315 in particular.

[10] "Report to the President-Elect," 23.

[11] "Report to the President-Elect," 5.

mission to the Air Force provided the service "put its house in order."[13] Interestingly, Gilpatric knew first hand of the house of which he spoke.

Prior to his Kennedy administration appointment, Gilpatric had chaired the board of the Aerospace Corporation, a non-profit firm he had worked with General Schriever to form in June 1960 in order to bring scientific and technical support to the Air Force in the planning and management of their missile and space systems.[14] Located in Sunnyvale, California, the Aerospace Corp. shared offices with its AFBMD counterpart. It also shared in the frustrations the division was having in trying to operationalize its ballistic missile systems. In fact, through the summer and fall of the previous year, while Schriever was deeply involved with General Anderson's Weapon Systems Study Group (WSSG), Gilpatric and Schriever often discussed the inefficiencies of the organizational arrangement between ARDC and AMC.[15] Gilpatric was also well aware of, and likely sympathetic to, Schriever's philosophical struggles within that group.

Now, as the new deputy defense secretary, Gilpatric could provide a conduit to circumvent the WSSG effort. His offer circulated among only a very small group of people within Air Force—newly-appointed Air Force Secretary Eugene M. Zuckert, Under Secretary Charyk, Generals White and Schriever—who all were intent on keeping

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[12] "Report to the President-Elect," 6.

[13] *History of the Air Research and Development Command, 1 January – 31 March, and Air Force Systems Command, 1 April – 30 June, 1961,* Vol. I., K243.01 January – June 1961, IRIS No. 484821, in USAF Collection, AFHRA, 30.

[14] *History of the Air Research and Development Command, 1 January – 31 March,* 29; Bernard Schriever, Gen, U.S. Air Force, Oral History Interview by Lyn R. Officer and James O. Hasdorff, 20 June 1973, typed transcript, K239.0512-676, IRIS No. 1076785, in USAF Collection, AFHRA, 24; Spires, 86.

[15] Schriever, Oral History Interview, 24.

it under wraps until they could build an acceptable organizational plan.[16] General Schriever recalled some years later how that plan materialized.

> Gilpatric called General White and said he would assign, or the Department of Defense would assign, the responsibility for space development to the Air Force on the condition that the Air Force would straighten its house out in the relationship between AMC and ARDC. General White called me on the phone, and I went over to see him. He told me what had transpired and asked me to set up a little task group to come up with a plan for accomplishing this. …In about ten days we had all the papers prepared which were in essence my minority report [as presented to the WSSG in August 1960] which, of course, General White knew and which he agreed was the direction to go.[17]

On 6 March, the Air Force, or more accurately, those select few within the Air Force aware of what was transpiring, presented a proposal to Secretary Robert S. McNamara and Deputy Secretary Gilpatric. In every respect, the proposal was Schriever's.

To "put its house in order," the Air Force planned to disband ARDC and AMC and to establish in their places the Air Force Systems Command (AFSC), the Air Force Logistics Command (AFLC), and the Office of Aerospace Research. The latter (formerly ARDC's Research Division) would continue to conduct pure basic research but would now report directly to the Air Force Headquarters.[18] AFLC would become a scaled-back version of what AMC had been. It would be responsible for procurement and supply of all common Air Force items and for supply and maintenance activities supporting operational systems *after* their delivery to operational units.[19] Finally, AFSC would emerge as the organization that Schriever had unsuccessfully lobbied for within the Air

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[16] *History of the Air Research and Development Command, 1 January – 31 March,* 30.

[17] Schriever, Oral History Interview, 24.

[18] *History of the Air Research and Development Command, 1 January – 31 March,* 35.

[19] "Proposal for Improved System Management," 16 March 1961, *History of ARDC/AFSC, 1 January – 30 June 1961,* Vol. 3: *Supporting Documents,* Document 20. K243.01, January – June 1961, IRIS No. 484823, in USAF Collection, AFHRA, 3. Citations here and following are from the task force

Force during his Anderson Committee deliberations the previous summer. The Air Force would assign it complete responsibility for "the acquisition of all system programs from development, test and production, through installation and checkout." Rather than partitioning responsibility for R&D between two commands, AFSC alone would "deliver complete, timely, and operable systems" to the Air Force's operational commands.[20]

The Air Force team also described to McNamara their envisioned internal structure for AFSC, an important detail from this study's perspective. The new R&D command would consist of four divisions, organized in an explicit air and space arrangement: two, the Space Systems Division (SSD) and Ballistic Systems Division (BSD), headquartered in Los Angeles; the Aeronautical Systems Division (ASD) located in Dayton; and the Electronic Systems Division (ESD) in Boston. Furthermore,

> The BSD will be responsible for the Atlas, Titan, and Minuteman programs. The SSD will be responsible for *military space programs assigned to the USAF and for certain development projects in support of Army, Navy and NASA.* …In addition, resident representatives of the Army, Navy, and NASA will be co-located with the Space Division to provide daily participation in their development programs.[21]

Thus, on 6 March 1961 the Air Force, and the Air Force alone, unveiled to the new defense secretary an organizational design for their national military space center. As Gilpatric had implied, not only did McNamara approve the reorganization plan, that same afternoon he released a memorandum to the other service secretaries putting the new plan into affect.

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report dated 13 March 1961. In fact, the report was submitted in paper form following its verbal presentation to the defense secretary on 6 March.

[20] "Proposal for Improved System Management," 2.

[21] "Proposal for Improved System Management," 3.

Defense Directive 5160.32, "Development of Space Systems" made McNamara's intent crystal clear. "[T]he Deputy Secretary and I have decided to assign space development programs and projects to the Department of the Air Force, except under unusual circumstances."[22] The defense secretary further explained that all agencies within DoD would still be authorized to conduct *preliminary* research in space technology, but that R&D proposals that warranted movement beyond this stage

> shall be submitted to the Director of Defense Research and Engineering for review [and then] to the Secretary of Defense… for approval. Any such proposal will become a Department of Defense space development program. …Research, development, test, and engineering of Department of Defense space development programs or projects, which are approved hereafter, will be the responsibility of the Department of the Air Force.[23]

Although McNamara also made the caveat that R&D responsibility did not predetermine operational responsibility, effectively, DD 5160.32 made the Space Systems Division of the Air Force Systems Command DoD's military *space* R&D agency.[24]

On 18 March, President Kennedy approved the proposal effective 1 April 1961. As that occurred, again with the president's approval, Lieutenant General Schriever took command of the Air Force's new organization and was submitted for his fourth star.[25] Schriever had his military space center, and the Air Force had its sister services out of space, this time, largely, for good.

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[22] Department of Defense Directive 5160.32, "Development of Space Systems," 6 March 1961, *History of ARDC/AFSC, 1 January – 30 June 1961,* Vol. 3: *Supporting Documents,* Document 1, K243.01, January – June 1961, IRIS No. 484823, in USAF Collection, AFHRA, 1; also cited in Dwayne A. Day, "Invitation to Struggle: The History of Civilian-Military Relations in Space," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program,* vol. II, *External Relationships,* ed. John M. Logsdon, 233-270 (Washington, D.C.: NASA History Office, 1996), 257.

[23] Department of Defense Directive 5160.32, 3-4.

[24] Interestingly, McNamara and Gilpatric kept all other service secretaries and chiefs of staff completely in the blind during this process.

[25] *History of the Air Research and Development Command, 1 January – 31 March,* 34. Congress confirmed Schriever's promotion to general on 1 July 1961.

As in early 1958, this was a heady period for airmen. Unlike then, however, the Kennedy administration had thus far provided plenty of indications to convince Air Force leaders that the service's prospects beyond the atmosphere looked as bright as they ever had. As a sweetener, two days prior to AFSC's official opening, Kennedy, in a special message to Congress, asked for an additional $144 million to accelerate Midas, Dyna-Soar, and other military space projects.[26] Meanwhile, Schriever's military space center had become a powerful organization within the Air Force structurally antithetical to the service's official notion that air and space form an indivisible continuum.

A Subtle Change in Focus

Given the apparent political climate of the Kennedy administration and the internal structural developments described above, a subtle change became evident in the spring of 1961 among the senior levels of Air Force hierarchy. Regarding the service's interests beyond the atmosphere, key leaders were becoming more ambitious, more urgent, and considerably more inclined to wander astray of the service's aerospace-oriented perspective.

The major force behind this shift was Schriever's increasing influence. The Air Force Space Study Committee Report he had commissioned the previous October empowered that influence. Assembled under Gardner's lead, the report was submitted to the new AFSC commander on 6 April 1961.[27] Thereafter, Schriever made sure that its broad recommendations "covering policy, technology, and organization," found

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[26] Carl Berger, *The Air Force in Space: Fiscal Year 1961,* April 1966, USAF Historical Division Liaison Office, in Jeffrey Richelson, ed. *Military Uses of Space, 1945-1991,* Washington, D.C.: The National Security Archive and Chadwyck-Healey (hereafter NSA), 1991, No. 00323, Microfiche, 16.

important audiences within the Air Force, the DoD, and eventually the highest level of government.[28]

The report's opening sentence—"The military implications of the frequency and payload size of Soviet space launches are a major cause of alarm for all members of our Committee"—made its motivational backdrop clear.[29] It then leveled an explicit critique of Eisenhower's space policy.

> Our insistence on classifying space activities as either 'military' or 'peaceful' has exposed us to unnecessary international political problems. This classification provides the Soviets with a convenient focus for attack upon our most vital space programs. The USSR does not attempt this distinction and so can proclaim its activities as entirely 'peaceful.'[30]

From a technology standpoint, the Gardner Report cited large booster development (to lift larger payloads into space) as the Defense Department's "most pressing need."[31] Beyond that, it urged the development of space weapons, manned space stations, and even lunar exploration.[32] More generally, it argued that technology needed to be pushed to the forefront of security strategy development. The "new reality [of] national security in the age of science," the report suggested, "demands that the emphasis and authority of research and development for exploiting technology *be primary*."[33]

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[27] Bernard A. Schriever, Lt General, to General Thomas D. White, 7 April 1961, Letter, *History of ARDC/AFSC, 1 January – 30 June 1961,* Vol. 3: *Supporting Documents,* Document 16a, K243.01, January – June 1961, IRIS No. 484823, in USAF Collection, AFHRA, 1.

[28] Report of the Air Force Space Study Committee, 20 March 1961, *History of ARDC/AFSC, 1 January – 30 June 1961,* Vol. 3: *Supporting Documents,* Document 15, K243.01, January – June 1961, IRIS No. 484823, in USAF Collection, AFHRA, 16.

[29] Report of the Air Force Space Study Committee, 2. See also McDougall, 313.

[30] Report of the Air Force Space Study Committee, 3.

[31] Report of the Air Force Space Study Committee, 15.

[32] Report of the Air Force Space Study Committee, 15, 12, 13; McDougall, 313.

[33] Report of the Air Force Space Study Committee, 7. Emphasis mine.

Finally, the Gardner Report presented an unabashed advocacy of Schriever's military space agency vision. It not only affirmed everything that McNamara had just enacted with regard to the establishment of AFSC, but went further still. The report referred to AFSC's California divisions as the "Space Development Force within the Air Force."[34] It urged the Air Force chief of staff "to accelerate and modify the training of [Air Force] personnel. …[To] establish special military career incentives" that would induce the service's "flying officers to embrace the rigorous studies and disciplines required to convert them into qualified Space Development officers."[35] Lastly, the Gardner Committee recommended that "preparation of all Air Force public information plans and programs relating to space be centralized in, and made the responsibility of, the Commander of the Air Force Systems Command."[36]

The pro-space survey lent overwhelming support to all that General Schriever had been seeking within the Air Force; the stature of its authors gave this support credibility. Not surprisingly, Schriever leveraged the report to justify his perspective. He forwarded copies to the Air Force secretary and chief of staff the day after receiving it. His personal letter to White cryptically revealed his own assessment. "Dear General White," he wrote, "The report's conclusions and recommendations have major implications relating to Air Force budget, planning and policy, for both near and long term future." He asked to meet with White to formulate "an appropriate course of action for implementing [them]."[37]

White's reaction to all of this would have provided important insight for this study, but unfortunately, it remains obscure within the historical record. That said, whatever his

[34] Report of the Air Force Space Study Committee, 7.

[35] Report of the Air Force Space Study Committee, 8.

[36] Report of the Air Force Space Study Committee, 16.

impressions may have been, they were likely overcome by events. Five days after the chief of staff first saw the report another Soviet space launch took world by storm, and thrust the Gardner survey into a significantly new light.

On 12 April 1961, Soviet Major Yuri A. Gagarin became the first human in history to enter space. Moreover, his was not just an up and down 15-minute sounding shot venture (as Commander Alan Sheppard's would be in roughly three week's time). Gagarin entered space traveling five times faster than any man had ever traveled before. He then orbited the globe and safely returned to earth 108 minutes later. Khrushchev told the heroic voyager upon his landing, "Let the whole world see what our country is capable of, what our great people and our Soviet science can do. …Let the capitalist countries catch up with our country, which has blazed a trail into space and which has launched the world's first cosmonaut."[38]

Back in America, although the missile gap fears had been laid to rest two months earlier, Gagarin's historic flight provided dramatic and immediate proof that "the Russians were substantially ahead of the United States in rocket and space technology."[39] The flight also spurred a now historic counter action, initiated on 25 May 1961 when Kennedy proclaimed before Congress "that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely

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[37] Schriever, Letter to White, 7 April 1961, 1.

[38] Osgood Carruthers, "Russian Orbited the Earth Once, Observing it Through Portholes; Space Flight Lasted 108 Minutes," *New York Times,* 13 April 1961, 1, 14; parts also quoted in Logsdon, *Decision*, 101.

[39] Carl Berger, *The Air Force in Space: Fiscal Year 1962,* June 1966, USAF Historical Division Liaison Office, in Jeffrey Richelson, ed. *Military Uses of Space, 1945-1991,* Washington, D.C.: NSA, 1991, No. 00327, Microfiche, 1. McNamara conceded publicly in early February 1961, after reviewing CORONA photos, that no missile gap existed. See also Richelson, *America's Secret Eyes*, 58.

to earth."[40] During the six weeks between Gagarin's flight and Kennedy's announcement, however, key Air Force officials seized opportunities, drew upon the momentum of the Gardner Report and the creation of AFSC, and brought their influence to bear upon the national-level decision-making apparatus. All were actions offering additional evidence of the subtle shift underway regarding the focus of Air Force leadership with respect to the aerospace concept.

The day following Gagarin's orbit, and in anticipation of the political response ahead, McNamara asked Air Force Secretary Zuckert to review the Gardner Committee's effort and extract its implications for DoD.[41] A week later, Lyndon Johnson, under Kennedy's direction to conduct "an overall survey of where we stand in space," also turned to the Air Force for inputs.[42] Indeed, Vice President Johnson approached Schriever for his views directly. Into these requests an Air Force vision for space—rather than aerospace—poured.

General Schriever's response, delivered to the vice president on 30 April, drew heavily from the Gardner Committee's recommendations. "[T]he artificial and dangerous constriction of 'space for peaceful purposes' and 'space for military uses,'" the new AFSC commander wrote in his memo, "…places at serious and unacceptable risk both our national prestige and our military security." Schriever further rebuked Eisenhower's space policy for its failure "to recognize the military potential of space and the fact that achievements in space have been the single most important influence in the

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[40] Senate Committee on Aeronautical and Space Sciences, 1971, *Statements by Presidents of the United States on International Cooperation in Space, A Chronology: October 1957-August 1971* (Washington, D.C.: US GPO, 1971), 25.

[41] Berger, *The Air Force in Space: Fiscal Year 1961,* 17.

[42] John F. Kennedy, to Lyndon B. Johnson, 20 April 1961, Memorandum, 168.7171-151, IRIS No. 1040299, in USAF AFHRA, 1; also cited in Logsdon, *Decision,* 109.

world prestige equation." He recommended that the nation attempt a "manned lunar landing and return to earth—*in 1967*." Such an endeavor, he said, would "reflect a singleness of purpose [and] sense of urgency" that America's response to the Soviet space challenge demanded.[43] To buttress his argument, Schriever closed his memo to Johnson giving full and explicit credit to the Gardner Committee Report: "I strongly endorse the conclusions and recommendations of this document, a copy of which has been made available to you."[44]

The following day, Air Force Secretary Zuckert, independent of Schriever's actions, delivered a similar position to McNamara. Concurring wholeheartedly with the Gardner Report, Zuckert argued that the current national space program prevented the nation from competing on equal terms with the Soviet Union. On behalf of the Air Force, he also made the case for a dramatic national objective…

> …some feat worthy not only of the nation's technological potential but of capturing the world's imagination. A clear decision to mount a manned expedition to the moon sometime between 1967-1970 would have tremendous international and national significance, while providing as a byproduct better ways to accomplish the national defense mission.[45]

Thus, in May 1961, the new administration was treated to an Air Force position on space that was effectively the vision outlined in the Schriever-initiated Gardner Report. History is clear about the path America's space program eventually took, just as it is clear that the Air Force would not forge that path. It is important to recognize, however, because of the way Kennedy's space policy position would unfold over the coming two years, how the

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[43] Bernard A. Schriever, Lt General, to Lyndon B. Johnson, 30 April 1961, Memorandum, 168.7171-151, IRIS No. 1040299, in USAF Collection, AFHRA, 3,1,4. Italics in original. Also cited in Erickson, 275-6.

[44] Schriever, Memo to Johnson, 5.

[45] Berger, *The Air Force in Space: Fiscal Year 1961,* 19. Emphasis mine.

Air Force position had been projected. Air Force leadership had pitched their vision ambitiously, earnestly, and from a decidedly air and space-inclined perspective.

WHITE RETIRES

Given what transpired over the spring of 1961, General White's retirement from the Air Force on 30 June 1961 was somewhat apropos. There was a certain symbolic symmetry to the aerospace concept's strongest advocate taking off his uniform and turning over the reins to the next generation of service leadership with hints of a conceptual changing of the guard underway. Although he was intimately involved, naturally, in the Air Force's machinations described above, evidence indicates the service's chief of staff remained committed to his concept during this period.

As it was discussed in the last chapter, White had written his most matured expression of the idea in January 1961 in the lead essay in the double edition of *AUQR* dedicated entirely to the aerospace force. As Kennedy was taking office, White was imploring airmen to embrace the aerospace concept's "complete continuity… when analyzing …performance capabilities, …weapons, …structure, and disposition of our forces."[46] In late April, just a few weeks following Gagarin's historic orbit, White testified before Congress still using his now-familiar language.

> If there was ever any doubt that Soviet aerospace technology is making rapid strides, it has been erased by the historic flight made by the Soviet astronaut who first circled the earth earlier this month…. [I]t is firm evidence of the Soviet's concentration on the earth's immediate envelope as the logical area for the near-term expansion of their own military aerospace power. …I am convinced that the failure of this Nation to recognize the warning, the challenge, and, now, the possible threat

[46] Thomas D. White, General, chief of staff, U.S. Air Force, "The Aerospace and Military Operations," *Air University Quarterly Review* XII, nos. 3 and 4 (Winter and Spring 1960-61): 4.

> contained in the achievement and in the Soviet's well-rounded and growing aerospace force, could prove disastrous.[47]

General White was clearly still a proponent of the aerospace concept.

At the same time, however, White's role in what unfolded during the first six months of the Kennedy administration also cannot be denied. In October, he had authorized Schriever to organize the Air Force Space Study Committee (Gardner's team) and to develop his space center idea. White was also closely involved in the AFSC coup the Air Force pulled off in early March. And one can only assume he remained well-positioned as the chief of staff to influence any of the Air Force's inputs into the national-level decision-making process energized following Gagarin's historic flight.

Interestingly, the tension during the last six months of White's career, between what he was saying and what he was doing describes very well the tension that had been slowly emerging within the Air Force at large for a few years. Perhaps White had finally resigned himself to it by this point. After all, either perspective—aerospace, or air and space—drove toward the same broader end: a greater Air Force role in national security activities beyond the atmosphere. And by the spring of 1961, the service, behind an air and space-centric perspective, had appeared to have accomplished just that. Perhaps then, by the close of his career, White was satisfactorily resigned with the compromise that his "aerospace" vision might not develop beyond a rhetorical one. Certainly, the reality that surrounded the service, and was emerging within it as well, had begun to suggest such was the case. The explanation best accounts for the last public words General White ever made in a uniform.

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[47] Congress, Senate, Subcommittee of the Committee on Appropriations, *Department of Defense Appropriations for 1962: Hearings before the Subcommittee of the Committee on Appropriations,* 87th Cong., 1st sess., 26 April 1961, 291-2.

At his retirement dinner, the outgoing Air Force chief of staff delivered a straightforward 9-10 minute farewell speech. He spoke of the many changes he had seen since joining the infantry in 1920; changes in the world situation, in technology, and in the civil-military relationship. He spoke with certainty of the Air Force's vast capabilities, and warned of the uncertainty in the dynamics of war.[48] And then he said this:

> Let us also take a long look at history—that of the past and that yet to come. Nations have risen and fallen by exploiting or failing to exploit their environment—first the land, then the sea, and then the air. We are now at the threshold of *a new environment—that of space*. I am certain that our very national existence will some day, in some way, depend upon superiority in that vast region of our planetary system.[49]

These words, surprisingly out of character for the aerospace concept's strongest advocate, were the last words General Thomas D. White spoke as an active duty Air Force officer. However, in no way do they suggest that the aerospace concept was dead; they simply indicate that its strongest advocate was no longer in the game.

During the first half of 1961, under a new administration that seemed much warmer to an active military role in space than its predecessor, the Air Force moved aggressively on the opportunities it was presented with. Offered sole responsibility for military space R&D, Air Force leaders seized it. Asked for their perspective on the future, they willingly engaged. However, the organizational voice behind these events was largely Schriever's. Consequently, although the tone of the Air Force's message increased in pitch, its tenor lost some of its aerospace quality, favoring instead the notion that space was distinct. Moreover, the tangible rewards came that came with, though not

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[48] Thomas D. White, General, chief of staff, U.S. Air Force, "Remarks at Retirement Dinner," June 1961, 168.7004-79, June 1961, IRIS 1001558, in USAF Collection, AFHRA, 2-4.

[49] White, "Remarks at Retirement Dinner," 4-5.

necessarily because of this perspective shift, also supported it. With the establishment of AFSC, its Space Systems and Ballistic Systems Divisions together became the nation's military space development center, and the Air Force opted for an organizational structure crucial to its future capacity beyond the atmosphere but antithetical to the aerospace concept.

Importantly, however, regardless of the perspective—aerospace or air and space—the Air Force goal remained the same: expansion into the broadening vertical environment. Thus, as White retired, despite the structural developments within his service and the shifting language and perspectives that seemed to be accompanying it, the aerospace concept's leading champion was no doubt satisfied with the results. Unfortunately, retrospect shows that the Air Force acquired these gains before the Kennedy administration had fashioned a comprehensive approach to space policy. When this condition changed, so too would the Air Force's fortunes.

KENNEDY'S SPACE POLICY EMERGES

The cold war that Kennedy inherited into was the same cold war that Eisenhower left behind. It remained ideological, global, and dangerous, focused on the same foe, fired by the same tensions, and fraught with the same constraints. Thus, while strategic alternatives were available to the new president, and Kennedy certainly exercised the opportunity to change tacks—flexible response was hardly synonymous with massive retaliation—where space was concerned, he came to stay his predecessor's course. Despite his campaign rhetoric, Kennedy eventually adopted Eisenhower's roadmap to work openly and internationally to establish a free and peaceful space regime but simultaneously keep highly secret America's ability to reconnoiter there from. True, the new president put a greater value on national prestige and chose to race the Soviets where his predecessor chose not to. However, the race was a civil one, and thus, from the standpoint of this study, represented a policy adjustment of magnitude but not direction.

It took Kennedy seven months and one cold war standoff before he fully opted for Eisenhower's dual-track approach to national space policy. Thereafter, he worked through the remainder of his presidency furthering its development. By November 1963, Kennedy had solidified the structures supporting it at home and had moved its principles firmly into the international realm abroad. On the visible front, NASA reigned clearly preeminent and civilian within the nation's space endeavors and an international legal regime for space came to hold "space for free and peaceful purposes" as its guiding principle. Hidden from view, the nation's spy satellites remained out from under Air Force control within a more strengthened, civilian-led organizational arrangement, and the Soviets even began tacitly accepting their presence. In short, by the time Kennedy's tenure came to its tragic end, space had become—politically, organizationally, and legally—a separate place, a sanctuary largely exclusive of the military, certainly of its war-making interests, and by default then of the Air Force's broader designs. None of which, of course, boded well for the aerospace concept's institutional prospects.

EARLY INDICATIONS

Kennedy's initial step in the direction of Eisenhower's space policy model was his most public and his most dramatic. It was also the step that distinguished his policy choices from his predecessor's in any significant way. Deciding to send American astronauts to the moon was hardly of the Eisenhower mold. Yet Kennedy assigned much more importance to the value of national prestige than Eisenhower did; hence, the decision's motivation (in the wake of Gagarin's orbit) and its long reach.[50] To create the opportunity for prestige to accumulate west of the Atlantic, the race needed to be extended far enough out to insure odds that were more favorable for winning it.

At the same time, however, Kennedy's choice to race using NASA's astronauts rather than the military's also affirmed Eisenhower's approach. Indeed, the drastic feat of going to the moon, more than anything, assured that the nation's space program would remain preeminently civilian in character. NASA's space budget surpassed DoD's for the first time in FY 1961 and rocketed skyward thereafter. By 1965, the civilian agency garnered \$5.14 billion for its space program against DoD's \$1.57 billion, and this budgetary relationship between the two remained in place into the early 1980s.[51] In short, Kennedy's commitment before Congress on 25 May 1961 to send men to the moon resulted in a ten-fold increase in NASA's appropriations, a similar increase in their political constituency, and "sealed the primacy of NASA's manned space flight program over the Air Force's."[52]

However, NASA's assured role as the lead agency in the nation's space program did not create in itself a policy environment demanding that space be considered a separate place. Evidence indicates the executive-level policy choices that would drive these conditions—namely whether or not to pursue a policy of space for peaceful purposes (and all the aspects thereof that made this option viable)—as of May 1961 had yet to attract President Kennedy's attention, nor would they before summer's end. This does

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[50] Logsdon, *Decision,* 125-6.

[51] Spires, 291, data extracted from appendix 3-2, table: "U.S. Government Space Activities, Fiscal Years 1959-1984."

not imply, however, that the administration as a whole was uninterested in them before then.

Although Kennedy may have been slow to address the full aspects of space policy, officials at decision-making levels below him were confronting space-related issues from the outset of his administration's tenure. A key source of early policy deliberations grew over the question of whether or not to maintain Eisenhower's secrecy blackout on the nation's reconnaissance satellites. The issue arose from a concern highlighted in the Wiesner Report.

"Perhaps the most disturbing and potentially dangerous part of the space program," the report had warned the incoming president, "is the international aspect of the SAMOS and MIDAS programs."[53] The Wiesner Committee had raised concerns over an October 1960 Soviet *International Affairs* article by Soviet legal scholar Georgi Zhukov. Zhukov suggested that in addition to showing the insincerity of "statements of U.S. officials about American interests in the peaceful uses of outer space, …American plans of space espionage… to employ artificial satellites for the collection of intelligence data are unlawful."[54] Zhukov had drawn his conclusions from a wide range of American media sources clearly revealing the Air Force's intent with its SAMOS satellite.[55]

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[52] Stares, 61-2.

[53] "Report to the President-Elect," 11.

[54] G. Zhukov, "Space Espionage Plans and International Law," *International Affairs* (English edition), (10 October 1960): 55, 56.

[55] Prior to Eisenhower's August 1960 decision to clampdown on the program and establish the OMSS, the Air Force had been very loose about publicizing the progress of its "secret" SAMOS satellite. Also of interest, the Soviet space law expert argued his position from an aerospace-based perspective. "From the viewpoint of the security of a state, it makes absolutely no difference from what altitude espionage over its territory is conducted. …Any attempt to use satellites for espionage is just as unlawful as attempts to use aircraft for similar purposes." See Zhukov, 56; McDougall, 259.

Worried about the security issue and the potential of a Soviet diplomatic assault on the satellite reconnaissance program because of it, the Wiesner team advised that in order

> to salvage the SAMOS program from destruction by international political action… we [should] unilaterally *announce the SAMOS flights* to the U.N., invite U.N. inspection…, *and make available the data obtained from the SAMOS to all nations of the U.N.* The urgency of arriving at a new solution to the SAMOS international relations problem is of the highest order of priority for our national security.[56]

The suggestion represented a stark reversal from Eisenhower's policy. It was also likely proffered in ignorance of the Corona program's activities and successes, which would explain why Kennedy was unresponsive to it. However, a new administration of policy-makers was moving in and questioning the old administration's practices. Given a lack of guidance from the president, the lingering memory of the U-2 shoot-down, and an increasingly successful, eager-to-be-recognized Air Force satellite program, disparities between departments about how to approach the blackout issue naturally emerged.

One camp, persuaded by Eisenhower's approach and wanting to enforce it more stringently, sprang up within the DoD-NSC-CIA circle. Secretary McNamara, National Security Advisor McGeorge Bundy, and CIA Director John A. McCone all supported James Killian's long-held position that lowering the visibility of space-born reconnaissance decreased the Soviet Union's incentive to interfere with it.[57] In addition, keeping such operations secret made any Soviet anti-satellite options more difficult to execute and likely curbed their motivation to camouflage their surface activities.[58]

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[56] "Report to the President-Elect," 11.

[57] Gerald. M. Steinberg, *Satellite Reconnaissance: The Role of Informal Bargaining* (New York: Praeger Publishers, 1983), 45.

[58] Peter L. Hays, "Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War" (Ph.D. diss., The Fletcher School of Law and Diplomacy, May 1994), 184; Philip J. Klass, *Secret Sentries in Space* (New York: Random House, 1971), 110.

Accordingly, and hardly a week in office, McNamara began to tighten the security reins on the Air Force space program's publicity. Official launch announcements, for example, were condensed to a single-page format that provided very little mission detail, press briefing invites were reduced from five days of lead time to one, and Air Force officers were increasingly barred from discussing the SAMOS program in any public forum.[59]

America's diplomats held an opposing view. Secretary of State Dean Rusk and UN Ambassador Adlai A. Stevenson both supported the Wiesner Report's position to drag all satellite operations out from under their secrecy veil. They felt the blackout policy was hypocritical and undermined U.S. credibility, particularly within UN circles, to cast its open and peaceful image against the Soviet Union's closed and secretive system.[60] Moreover, maintaining the secrecy directive on reconnaissance satellites merely heightened the risk of stumbling into another humiliating U-2 shootdown-type scenario.

In support of the open approach, Rusk wrote the president a memo on 2 February 1961 seeking to discuss the administration's policy approach to space. Kennedy's secretary of state suggested that the U.S. should take the lead in UN discussions over the legal aspects of outer space. He also wanted to sound out the president's views on space cooperation with the Soviets. Finally, while McNamara was clamping down on SAMOS publicity, Rusk expressed his own misgivings about the blackout restriction on

[59] Steinberg, 42-3.

[60] Steinberg, 46. Interestingly, another organization against the blackout, but for different reasons, was the Air Force, which of course had been very much involved in developing the Wiesner Report. Airmen argued against the blackout from the deterrence standpoint—Soviet awareness of general U.S. capabilities improved the credibility of the U.S. strategic posture. Satellite publicity also provided Congress and the American public evidence of the Air Force's growing space prowess. See also Steinberg, 41, 44.

reconnaissance satellites, calling it a "troublesome issue" which threatened to be raised by other nations at any time.[61]

Kennedy, it seems, never responded. Rusk, however, continued working the issue on his own. That spring, he and Stevenson had their staffers generate a proposal to explore a diplomatic option that sought international acceptance of reconnaissance satellite activities. The proposal rested on securing international agreement on the principle that space stood beyond the limits of national sovereignty and that "non-aggressive" activities in space should therefore not be subject to restrictions.[62] The argument, of course, required the open acknowledgement of America's space reconnaissance activities.

A second but related space policy thread also emerged from the State Department during the summer. Picking up on an in-house position paper written in July 1960 under the previous administration, Rusk's team reengaged on a proposal to start fostering an international climate of legitimacy in space. In anticipation of the year's upcoming UN General Assembly gathering, DoS and UN staffers fashioned a UN resolution proposal to formally accept international legal standards as applicable to outer space and its celestial bodies.[63]

Thus, by August 1961, within administrative circles below the president, two general perspectives had formed around the satellite blackout question affecting policy development and departmental actions independent of the other. While the Defense Department was pushing the nation's emerging space reconnaissance capability further under cover, the State Department was pushing toward greater openness and legitimacy.

[61] Stares, 66; Rusk memo as cited in Steinberg, 47.

[62] Steinberg, 45.

Taken together, these two positions were characteristic of the previous administration's dual-track, visible and hidden path approach to space. However, thus far within the Kennedy administration, they were two disparate voices. The Defense and State Departments, each acting independent of the other, were functioning at cross-purposes because Kennedy had yet to evaluate or decide on any sort of a deliberate overarching space policy. A cold war crisis at summer's end, however, would change all this.

TITOV, BERLIN, BLUSTER, AND BLUFF

In some respects, Gagarin's 12 April 1961 orbit of the earth can be considered as Kennedy's *Sputnik.* Four months after sending the first human around the world in space, like the script from the fall of 1957, the Soviets repeated the feat to demonstrate that the Gagarin's trip had been no fluke. On 6 August 1961, Major Gherman S. Titov lifted off into space and spent the entire day circling the globe, 17 times in fact.[64] As he did so, however, a storm was gathering over Berlin.

Soviet and East German pressure to remove western influence from the divided city had built all summer long, and by early August had wound into a tightened coil. In the two weeks before Titov's flight, both powers had exchanged veiled references to war.[65] Upon the cosmonaut's landing, Khrushchev leveraged the event as he had with *Sputnik*. "We will show you our strength," he said. "You do not have 50 and 100 megaton bombs.

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[63] Matthew J. Von Bencke, *The Politics of Space: A History of U.S. – Soviet/Russian Competition and Cooperation in Space* (Boulder: Westview Press, 1997), 49; Stares, 66.

[64] Berger, *The Air Force in Space: Fiscal Year 1962,* 1.

[65] John Lewis Gaddis, *We Now Know: Rethinking Cold War History* (Oxford: Clarendon Press, 1997), 146.

We have stronger than 100 megatons. We placed Gagarin and Titov in space, and we can replace them with other loads that can be directed to any place on earth."[66]

Eight days later, the Berlin problem escalated to crisis conditions when two Russian Army divisions took up positions outside the city, sealed the border separating its two halves, and then set to building the Wall. At month's end, the Soviets declared their intentions to unilaterally break the 3-year nuclear weapon moratorium and begin testing their new giant H-bombs. In that announcement, they warned that they "possessed rockets capable of delivering a superbomb 'to any point on the globe.'"[67] Soviet bluster had ratcheted up tension worldwide.

Kennedy's plan to attenuate it unfolded during the month of September in three seemingly unrelated events. The first was a precursor that occurred out of sight within the deep recesses of government. The remaining two were simultaneous, orchestrated events, in full public view, and designed to appear as sheer coincidence to all but their intended target. Retrospect reveals that together, these three actions mark the point in Kennedy's presidency where his approach to space matured beyond just racing Russia to the moon.

In September 1961, Kennedy's national space policy took its full shape. The president first committed to preserving satellite reconnaissance as a top secret, civilian-controlled national commodity. He then leveraged some of its harvest to call the Soviet bluff while simultaneously announcing to the world America's intent to be aggressive in pursuing an international framework for space designed to preserve it for peaceful purposes. In both structure and form, Kennedy opted for a continuation of Eisenhower's

[66] Klass, 62; also cited in Stares, 74.

approach, which would translate into an environment unsupportive of the notion that air and space are indivisible.

On 6 September, a small, in-the-know group of senior-most officials from the CIA, the DoD, and the Air Force quietly signed a charter to dissolve the OMSS and create the National Reconnaissance Office (NRO) in its place. The office was "organized separately within the Department of Defense," and became "responsible for … all Department of Defense satellite and air vehicle overflight projects for intelligence."[68] The agreement retained Joseph Charyk as the new director, and established the NRO as its own budget authority answerable to both the DoD and the CIA.[69] Importantly, however, the Air Force remained responsible for a large amount of the NRO's support—a relationship that would have significant long-term cultural effects within the service. Air Force personnel, under a veil of deep secrecy, would continue developing, operating, and maintaining most of the agency's assets, but those assets would be taking pictures to support national strategic policy rather than Air Force war plans. And as the ink was drying on the NRO charter, Kennedy leveraged some of those pictures to ease the pressure building around Berlin.

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[67] Seymour Topping, "West is Blamed," *New York Times*, 31 August 1961, 1.

[68] Cyrus Vance, Deputy Secretary of Defense, "Department of Defense Directive Number TS 5105.23: National Reconnaissance Office," 27 March 1964, in John M. Logsdon, ed., *Exploring the Unknown: Selected Documents in the History of the U.S. Space Program* Vol. I: *Organizing for Exploration*, 373-5 (Washington D.C.: NASA History Office, 1995), 373.

[69] National Reconnaissance Office, *The National Reconnaissance Office, NRO: Its Origin, Creation, & Early Years,* by Gerald K. Haines, NRO Historian, (ND), 19; Burrows, 239. The interdepartmental arrangement would require three more agreements over the next four years to iron out a host of organizational issues, however, each only further solidified the organization's structure. See *The National Reconnaissance Office,* 18-25. In fact, many details of this organization's history remain obscure. The quoted material in this paragraph, as the date of the document indicates, comes from the only NRO charter document thus far publicly released. The existence of this organization was not officially acknowledged until September 1992.

On the morning of 25 September, the *Washington Post* published a column written by Joseph Alsop, who was known for his personal ties to the president. In it, Alsop revealed that the Defense Department had recalculated its estimates of the Soviet Union's probable ICBM striking power; its earlier figures had been significantly overstated.

> The maximum number of ICBMs that the Soviets were [previously] thought to have… was on the order of 200—just about enough to permit the Soviets to consider a surprise attack on the U.S. The maximum has now been drastically reduced, however, to less than a quarter of the former figure—well within 50 ICBMs, and therefore not nearly enough to allow the Soviets to consider a surprise attack on this country. …[T]he revised figures… mean that Khrushchev does not yet have the inter-continental striking power to back up his rocket-rattling.[70]

It was not clear how Alsop acquired this information, nor was it clear, to the public anyway, how the estimate had been (re)assessed. Its accuracy, however, no doubt concerned Khrushchev, who now knew that Kennedy knew that the Soviets were far from credibly being able to threaten a missile attack.

Later that same day, but in a different city, President Kennedy wore a different face. Before a world audience to open the sixteenth session of the UN's annual general assembly, the president told international leaders and diplomats:

> As we extend the rule of law on earth so must we extend it to man's new domain: Outer space.
>
> All of us salute the brave cosmonauts of the Soviet Union. The new horizons of outer space must not be riven by the old bitter concepts of imperialism and sovereign claims. The old reaches of the universe must not become the new arena of an even colder war.
>
> To this end, *we shall urge proposals* extending the United Nations Charter to the limits of man's exploration in the universe, reserving outer space for peaceful use, prohibiting weapons of mass destruction in space or on

[70] Joseph Alsop, "Matter of Fact… Facts About the Missile Balance," *The Washington Post,* 25 September 1961, A-13. Portions also cited in Steinberg, 50.

> celestial bodies, and opening the mysteries and benefits of space to every nation.[71]

Kennedy thus presented three basic regime-defining principles before the UN—space should be a legally governed realm, a peaceful realm, and a free realm—as well as a more specific rule proposal to prohibit weapons of mass destruction there.[72] Interestingly, all four offerings were identical in substance to those that Eisenhower delivered from the very same podium the year prior, save for an important difference.[73] Eisenhower had suggested them. "I propose that we agree to…," were his words. Kennedy, on the other hand, took a further step. By saying "we shall urge proposals," he committed.

In November, America's UN delegation introduced through COPOUS Kennedy's proposal that he had outlined earlier, excluding the weapons ban. The following month, modified slightly, that proposal passed unanimously in the General Assembly as UN Resolution 1721 (XVI), "International Cooperation in the Peaceful Uses of Outer Space."[74] While it reaffirmed an acknowledgement of one principle (space as a peaceful realm), it explicitly codified the other two (space as a legal realm and a free realm).

> The General Assembly, [r]ecognizing the common interest of mankind in furthering the peaceful uses of outer space and the urgent need to strengthen international cooperation in this important field…
>
> Commends to States… the following principles:
>
> International law, including the Charter of the United Nations, applies to outer space and celestial bodies;

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[71] As reprinted in "The Text of President Kennedy's Address to the United Nations General Assembly," *New York Times,* 26 Sep 1961, 14. Emphasis mine.

[72] "Principles" and "rules" as used here refer to Stephen Krasner's well-known framework for understanding regimes. Stephen D. Krasner, "Structural Causes and Regime Consequences: Regimes as Intervening Variables," *International Organization* 36, no. 2 (Spring, 1982): 185-9.

[73] See Chapter 6, pp. 274-5.

[74] Von Bencke, 49.

> Outer space and celestial bodies are free for exploration and use by all States in conformity with international law and are not subject to national appropriation.[75]

This stands as the first act of true substance in the history of international space agreements. It represents the genesis of today's outer space regime and as such constitutes a turning point in the development of space law.[76]

Thus, eight months into his presidency, Kennedy's intentions in the realm beyond the atmosphere had at last become clear. More importantly, those intentions represented a complete adoption of Eisenhower's dual-track, visible and hidden path approach, if but with greater vigor. In April, by sending NASA to the moon, he resoundingly committed to maintaining that organization's preeminence in the nation's space program. In early September he committed to maintaining a close-hold, civilian-led structure for controlling the nation's satellite reconnaissance program. Finally, by September's end, in part because of the security and political leverage these ultra-secret satellites had provided, he committed to seeking the extension of international law's rule into space and to the realm's preservation as a peaceful sanctuary for every nation's use and benefit. From the standpoint of this study then, Kennedy, like his predecessor in every significant respect, fully came to embrace an approach to space that implicitly demanded the realm be recognized, organized, and exploited as a separate and distinct place. Moreover, by the close of 1961, the rest of the world had shown distinct signs of embracing that perspective as well.

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[75] UN General Assembly Resolution 1721 (XVI), International co-operation in the peaceful uses of outer space, 20 December 1961, 1 (accessed 26 Nov 2004); available from http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_16_1721.html.

[76] Delbert R. Terrill, Jr., *The Air Force Role in Developing International Outer Space Law,* (Maxwell Air Force Base, AL: Air University Press, 1999), 59.

A SPACE POLICY REALIZED

The remainder of the Kennedy presidency, where space policy development is concerned, is simply one of further advancing the agenda Kennedy had established by the fall of 1961. Within two years of this point, the administration was able to parry a Soviet diplomatic assault questioning the legality of the satellite reconnaissance program and garner instead their tacit approval of the practice, which solidified the NRO's organizational viability for the long term. Moreover, American diplomats secured an agreement not to place weapons of mass destruction in space and coaxed a second major space-related resolution through the UN that established the basic framework upon which the 1967 Outer Space Treaty would eventually hang. The separation of air and space thus moved from an American policy position to an internationally accepted legal reality.

The Soviet offensive on America's reconnaissance satellites officially began on 7 June 1962. Trying to capitalize on momentum that Resolution 1721 had generated six months earlier, the Soviet UN delegation submitted for consideration in the next general assembly a "Draft Declaration of the Basic Principles Governing the Activities of States Pertaining to the Exploration and Use of Outer Space." Most of the principles therein were either compatible with U.S. objectives or benignly ambiguous. Paragraph eight of the document, however, raised American concerns significantly. "The use of artificial satellites for the collection of intelligence information in the territory of foreign states," it stated, "is incompatible with the objectives of mankind in its conquest of outer space."[77]

Over the year that followed, Soviet diplomats reiterated this particular issue extensively. Georgi Zhukov, who authored the October 1960 article highlighted in the

[77] Von Bencke, 45; quotations as cited in Stares, 69.

Wiesner Report, argued in Brussels at a conference of the International Law Association that "U.S. reconnaissance satellites constituted aggression and a Soviet response would be a legitimate act of self-defense."[78] In September, Soviet delegate to the UN, Platon D. Morozov, complained in COPUOS meetings about "U.S. spy satellites"[79] And in December before the General Assembly's Political Committee, he argued, "[Satellite] observation is just as wrong as when intelligence data are obtained by other means, such as by photography from the air."[80] From the American perspective, this was an untenable proposition that demanded a thoughtful and coordinated counterstrategy.

Toward that end, Kennedy established a high-level strategy team that became known as the "NSAM 156 Committee," after the presidential memo that created it. Kennedy's National Security Action Memorandum (NSAM) 156 called for a standing interagency committee, comprised of deputy secretaries or directors from DoS, DoD, CIA, NRO, NASA, the Arms Control and Disarmament Agency, and the White House, "to review political aspects of U.S. policy on satellite reconnaissance." Its very existence was classified and any reference to this group's purpose or work was considered top-secret information.[81]

The committee outlined a comprehensive strategy, submitted to Rusk on 1 July 1962 and approved by the president ten days later, which fulfilled their charge in every respect.[82] They endorsed the blackout policy on reconnaissance satellites and advised

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[78] Steinberg, 54.

[79] Klass, 124-5.

[80] As cited in Klass, 125.

[81] Raymond L. Garthoff, "Banning the Bomb in Outer Space," *International Security* 5, no. 3 (Winter 1980-1981): 26.

[82] Garthoff, 26-7.

against further advance notification of rocket launchings in general.[83] In addition, to generate support for the secret program within the international arena, the committee recommended the administration begin a series of discreet, head-of-state-level briefings "to our closest allies" so as to provide "them a sense of what the scope of our program was, how good it was, and what its relation was to our overall strategic picture."[84]

The NSAM 156 Committee also examined how to approach the public political and legal arguments that lay ahead. They organized a publicity campaign to deflect the diplomatic conversation away from "spying" and highlight instead the broader benefits that satellite *observation* offered to mankind. Sharing NASA-collected photographs from outer space with other nations, the campaign drew out the promise of what this capability brought to weather forecasting, geology, and a host of other scientific endeavors.[85]

In conjunction with this information effort, the committee also developed a legal argument to counter the Soviet-held perspective that space espionage was illegal. Leonard Meeker, an NSAM 156 Committee member from DoS explained the essence of this argument in an April 1963 presentation to law students at Montreal's McGill University.

> International law imposes no restrictions on observation from outside limits of national jurisdiction. Observation from outer space, like observations from the high seas or from the air space above the high seas, is consistent with international law.… *Observations from space may in time provide support for arms control.…* If in fact a nation is not preparing surprise attack, observations from space could help us know this and thereby increase confidence in world security which might otherwise be subject to added and unnecessary doubts.[86]

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[83] Richelson, *America's Secret Eyes*, 72-3.

[84] Oral interview with Abram Chayes, DoS legal advisor, as quoted in Stares, 69.

[85] Richelson, *America's Secret Eyes*, 72.

[86] As quoted in Von Bencke, 56 and Klass, 125-6.

Importantly, Meeker's talk represents one of the earliest public statements to recognize explicitly the value that reconnaissance satellites could bring to arms control verification. This value would prove crucial in years to come, and in fact played an important role in helping to usher in the first arms control agreement for space—the final piece of the NSAM 156 Committee's space policy strategy.

An initiative to ban nuclear weapons from space had been examined as part of the NSAM 156 Committee's original space policy strategy in July 1962. However, given the committee's various perspectives, the members struggled initially to generate consensus on the idea. Thereafter, diplomatic impasses over inspection requirements in general caused this particular initiative to stall.[87]

A breakthrough occurred, though, in early September 1963. While on an arms control trip through the Warsaw Pact nations, the committee's executive secretary, Raymond L. Garthoff, dropped an informal indication to a veteran Soviet diplomat that the U.S. would be willing to forego the need for inspection measures by relying on "national means of verification"—code words of the period for satellite reconnaissance—to monitor compliance.[88] This, coupled with the fact that the Soviets had begun over the previous summer to enjoy their own success with their Kosmos satellite reconnaissance program, together unstuck the weapons ban in space process.[89]

On 19 September, just two weeks after Garthoff delivered his diplomatic nudge, Soviet Foreign Minister Andrei A. Gromyko made a surprise announcement during an address in New York before the UN General Assembly.

[87] Garthoff, 29-33.

[88] Garthoff, 33-4.

[89] Klass, 126-9.

> The Soviet Government deems it necessary to reach agreement with the United States Government to ban the placing into orbit of objects with nuclear weapons on board. We are aware that the United States Government also takes a positive view of the solution of this question… It would be a very good thing if an understanding could be reached and an accord concluded on this vital question. The Soviet Government is ready.[90]

The very next day Kennedy offered his enthusiastic acknowledgement: "Let us get our negotiators back to the negotiating table to work out a practicable arrangement to this end."[91]

UNGA Resolution 1884 (XVIII) passed in a unanimous vote of the UN General Assembly on 17 October. The resolution called "upon all States to refrain from placing in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, installing such weapons on celestial bodies, or stationing such weapons in outer space in any other manner."[92] This was not a ban, nor was it a treaty. It was simply a statement of intent. However, it represented a significant step toward disarmament in the context of the cold war. Three years hence, the actual ban would fully materialize when the words "calling upon States to refrain from" were replaced by "States undertake not to" in the first line of Article IV of the Outer Space Treaty.

Where this study is concerned, however, what ceased being said with Resolution 1884's passage was far more significant than the resolution itself. Although nothing was ever officially declared, hereafter, Soviet diplomatic efforts to halt U.S. satellite

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[90] As cited Garthoff, 34.

[91] Stares, 89.

[92] UN General Assembly Resolution 1884 (XVIII), Question of general and complete disarmament, 17 October 1963, 1 (accessed on 29 September 2005); available from http://www.un.org/documents/ga/res/18/ares18.htm.

reconnaissance efforts effectively stopped. From this point in time forward, the Russians tacitly accepted (and participated in) the practice without dispute.[93]

Despite an early period that indicated otherwise, Kennedy thus came to embrace Eisenhower's policy approach to space—both its visible and its hidden paths—wholeheartedly. Indeed, he steered them to fruition. Instead of aggressively opening up the realm to military interests, as it appeared initially he might, Kennedy, like his predecessor, came to cordon space off with explicit intent. More strongly even than Eisenhower had intended it, in every respect the new president made space a separate, distinct, and peaceful place.

NASA not only became the face of the nation's space program, but with its sights extended toward a lunar landing, it became the program's heart and soul as well. Within the international community, Kennedy moved Eisenhower's notion of space for peaceful purposes from aspiration well into the realm of reality—primed to become fully so within a month following his assassination. Finally, Kennedy also came to appreciate the enormous value of the nation's satellite reconnaissance program and the imperative of keeping it in civilian hands and well hidden from public view. Moreover, the Soviets came to agree with him on this count.

Consequently, by November 1963, the environment surrounding the Air Force became one that offered no support whatsoever to the notion that air and space were an indivisible continuum. The service, throughout these developments, endeavored to influence them, but with increasingly less affect. Meanwhile, the institutionalization of the aerospace concept ebbed considerably.

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[93] Stares, 71.

THE AIR FORCE SETTLES INTO AIR AND SPACE

During the last two and a half years of the Kennedy presidency, from the summer of 1961 through mid-November 1963, the forward momentum of the aerospace concept's institutionalization within the Air Force eroded away. The idea did not disappear by any means. However, its penetration slowed, and as the conditions influencing this trend further solidified, the process eventually came to a halt.

Apart from the indirect environmental influences described in the previous section, three factors internal to the Air Force directly contributed to this development. First, with White's retirement (and with Schriever's corresponding rise in stature) the aggregate level of leadership support for the idea ebbed. Secondly, organizational structure within the Air Force, trending strongly already toward an air and space framework, reinforced this change. Finally, resource-related decisions felled Dyna-Soar, the key Air Force program that had the potential of enabling a true aerospace capability.

Amidst these organizational dynamics, the aerospace concept's relevancy value waned. Increasingly less aligned with the Air Force's real-time trends, the concept became less persuasive in describing tomorrow's organizational reality, but only to a point. This chapter's final section describes these events.

LEADERSHIP FOCUS SHIFTS

From the leadership focus perspective, under General White's tenure, the Air Force headquarters at the Pentagon had become the organizational home of the aerospace concept and the wellspring for its penetration into the rest of the service. Following his retirement on 30 June 1961, however, aerospace began to lose some of its traction there. A comparison of two long-range planning documents produced within the air staff during this period—one just prior to General White's retirement, and the other three months thereafter—illustrates this development. Themes and issues in various public statements from Air Force leadership thereafter continued to support this trend.

Two of the air staff's six directorates developed strategic forecasts that summer, each to help the Air Force articulate what its future beyond the atmosphere would require. In mid-June, two weeks prior to White's departure, the Plans and Programs Directorate finished a paper titled "Long-Range Concepts as to the Nature of Future War: USAF Views on Military Activities in Space." The document represented a complete affirmation of the aerospace concept, and as such stood as a testament to the outgoing chief.

"Long-Range Concepts" reiterated the Air Force's position that space was "a continuous extension of the aerospace flight realm" in which the service had operated since its beginning.[94] It also leveraged the ideas of air power theory to present a now-familiar rationale for extending the Air Force's operational capabilities out beyond the atmosphere.

> The key to military decisiveness throughout the ages was 'access to targets.' The nation that controlled access to vital enemy targets and could simultaneously deny the enemy access to its own territory was dominant in war. Space systems, because of their dramatically increased performances, [are] a means of controlling from above weapons systems operating at lower levels in aerospace.[95]

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[94] From Air Force Objective Series 2/2, "Long-Range Concepts as to the Nature of Future War: USAF Views on Military Activities in Space," p.1, as cited in Berger, *The Air Force in Space: Fiscal Year 1961,* 32.

[95] Berger, *The Air Force in Space: Fiscal Year 1961,* 32.

The paper went on to advocate a future air force comprised of systems that would enable "the extension of USAF responsibilities for area defense and defense in depth in aerospace."[96] The Plans and Programs effort was an argument based upon, imbued with, and perpetuating an aerospace perspective.

In sharp contrast, a similar document from the Development and Technology Directorate, begun three weeks after White's retirement and completed on 20 September, spoke in decidedly different tongue.[97] "The Air Force Space Plan," as it was titled, also argued for "an aggressive military space program" behind the Air Force's well-worn logic of deterrence: "Whereas the demonstration of technological superiority will engender national prestige, the demonstration of military supremacy will deter war."[98] However, this was a paper about space, and space alone.

The plan paid little attention to the notion of aerospace, except to cite "advanced aerospace propulsion" as a deficient area of future technology development and to include as a corresponding recommendation, the need to better support this area.[99] Otherwise, aerospace, in word or idea, is elsewhere hardly found within the 88-page document.

Instead, this 10-year outlook advocated a perspective that space was a separate and distinct place. The paper was explicit about highlighting the space environment's uniqueness. "It is clear that space provides the opportunity for unprecedented altitude, speed, and endurance capabilities. On the other hand, use of space systems presents new

[96] Berger, *The Air Force in Space: Fiscal Year 1961,* 32.

[97] Berger, *The Air Force in Space: Fiscal Year 1962,* 18.

[98] *United States Air Force Space Plan*, September 1961, K168.041-11, IRIS No. 0472477, in USAF Collection, AFHRA, 7, 15.

[99] *Air Force Space Plan*, 55, 65, 85-6.

technological and operational challenges because of lack of gravity and atmosphere and the presence of radiation fields."[100] The plan pushed to accelerate development of cheaper and more powerful boosters, of docking, rendezvous, and orbital transfer capabilities. It strongly advocated the military requirement for man-in-space missions and supported manned spacecraft and space station development. Indeed, it even urged the movement of Dyna-Soar—the service's only aerospace-enabling system—into a space-only development track by recommending the program forego its non-orbital phase and proceed directly to orbital flight testing.[101]

Each of these papers was vetted through the service's senior-most leaders. Each was used over the coming months to help the Air Force justify its budget requirements. The first showed that aerospace still enjoyed support within the air staff. However, the approval and promulgation of the second report indicates that as of September 1961, the aerospace concept had lost some traction (to the extent that its non-aerospace language and argument had garnered support). It is hardly surprising that the Development and Technology Directorate—given its close relationship with the Air Force's R&D community—was the portal within the air staff through which these aerospace-eroding changes arrived. Nor is it surprising that following White's retirement, the tone emerging from senior leadership followed a similar trend; although General Curtis E. LeMay became the new Air Force chief of staff, General Schriever moved into the role of the Air Force's primary advocate for matters beyond the atmosphere.

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[100] *Air Force Space Plan*, 15.

[101] *Air Force Space Plan*, 87-8; see also Robert Frank Futrell, *Ideas, Concepts, and Doctrine,* Vol. 2, *Basic Thinking in the United States Air Force 1961-1984* (Maxwell Air Force Base, AL: Air University Press, December 1989), 216.

Schriever, awarded his fourth star on 1 July, proactively began extending himself further into the public forum. In the wake of Gagarin's flight, with international tensions rising over Berlin, and given the lack, at this point, of a fully developed national space policy, the commander of the Air Force's R&D ship held no reserve in trying to influence the public discourse of America's future in *space*. That summer, he began taking direct aim at the remnants of Eisenhower's space policy.

During Senate testimony in mid-July before the Preparedness Investigating Subcommittee, Schriever voiced his perspective. "I think we have been inhibited in the space business through the 'space for peace' slogan. I think there has been too arbitrary a division made between the Department of Defense and NASA in this area."[102] In September, again before the Senate, Schriever warned of "an impending and expanding [Soviet] space threat" that endangered both U.S. international prestige and national security. He voiced his frustration that America's space program had been held back "under an unnecessary, self-imposed restriction—namely, the artificial division into 'space for peaceful purposes' and 'space for military uses,' when in fact no technical and little other distinction between the two exists."[103] His words echoed the Gardner Report, completed for him the spring before. Following Kennedy's space for peaceful purposes gesture at the UN, Schriever's argument began to attract public attention.

Two weeks after the president's international offering in New York, the *New York Times* reported about a speech General Schriever delivered at an Air Force Association symposium on the peaceful and military uses of space. The article opened by quoting his final words and commented that they "summed up the opinions of the other space

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[102] As quoted in Berger, *The Air Force in Space: Fiscal Year 1962,* 4; Spires, 101.

experts… that the peaceful uses of space and the military uses of space cannot be separated." Here is the referenced quote from the speech.

> Only by being strong can we preserve the peace. This is the primary objective of the military forces today. When the Strategic Air Command was formed, the people of America understood that 'Air Power is Peace Power.' We need a clear understanding today that 'Space Power is Peace Power.' Space power must become a vital part of our national strength and security.[104]

Most of the 1.4 million *Times* subscribers who may have read these words were probably focused on the contrasting position between the Air Force general and the policy statements of his commander in chief.[105] Airmen, however, likely noticed an additional subtlety herein as well. Schriever's choice to avoid using the Air Force's official slogan, "Aerospace Power for Peace," was no doubt deliberate.

Schriever's opposition to the aerospace concept, by this point, was long apparent. The notion that space was a distinct place, however, had also begun leaking into the comments of other Air Force leaders who, during White's tenure, had been advocates of the single continuum concept.

General LeMay, on 26 October 1961, delivered a speech to the American Ordnance Association titled "The Promises of Space." He spoke of a national security requirement "to insure man's ability to work and survive in the space environment." His concern, by the talk's conclusion, was clear: "A nation that has maneuverable space vehicles and revolutionary armaments can indeed control the world. For peace or for aggression."[106]

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[103] Berger, *The Air Force in Space: Fiscal Year 1962,* 5.

[104] "A Job For the Military, Too," *New York Times,* 8 Oct 1961, M1.

[105] Between 1 October 1961 and 31 March 1962, the average circulation for Sunday *NYT* was 1,401,378. Data found in *Information Please Almanac: Atlas and Yearbook, 1963* (New York City: Simon and Schuster, November 1962), 281.

[106] Curtis E. LeMay, General, chief of staff, U.S. Air Force, "The Promises of Space," Address, American Ordnance Association, 26 October 1961, in Department of the Air Force, Director of

To a much broader audience the following month in an interview published in *U.S. News and World Report*, LeMay said, “Space produces a new field in which to operate weapon systems.” Asked if he foresaw any opportunities for the practical use of weapons in space, the Air Force’s leading general replied, “Yes, I’m sure of it. It provides a medium for reconnaissance, warning, communications and for delivering weapons over enemy territory.”[107]

Air Force Secretary Zuckert also on occasion began referring to space as if it were its own separate medium. “I would like to emphasize the importance of developing military capabilities,” he said in early January 1962, “in still another area – the vast area of space. …We know that space will not be free to men unless peace-determined men keep it free.”[108] Later in April, he testified before Congress that “Man has learned that none of the physical environs of his Earth—the land, the sea, the air—are bars to military operation, and that all are subject to exploitation for military as well as other purposes. Again, space is no different. …And space calls for defenses against aggression the same as the land, the seas, and the air.”[109] And finally, in September 1962, in an article: “We share the hope that the space medium will not be used for aggressive purposes, but we recognize the military possibilities in space.”[110]

Such comments are evidence of a subtle shift in the perspectives of senior Air Force leaders—a shift that even General White arguably was making as he neared retirement.

Information, Office of the Secretary of the Air Force, *Air Force Information Policy Letter* (hereafter AFIPL)*, Supplement for Commanders,* No. 100, January 1960, 12, 14. Also cited in Berger, *The Air Force in Space: Fiscal Year 1962,* 7.

[107] As reprinted in Department of the Air Force, Director of Information, Office of the Secretary of the Air Force, *AFIPL Supplement for Commanders*, no. 110, September 1962, 14.

[108] *AFIPL Supplement,* no. 110, 27.

[109] *AFIPL Supplement,* no. 110, 30.

This does not imply that the aerospace concept was being discarded. It does indicate, however, that as Kennedy's strategic choices for space were emerging, the service's senior leaders were becoming increasingly willing, consciously or not, occasionally to adopt language more consonant with the language framing the national discourse. This subtle perspective shift of Air Force leadership was also better aligned with the service's evolving organizational structure.

ORGANIZED FOR AIR AND SPACE

The Air Force's R&D community had long been organizing itself into an air and space, rather than aerospace, structure. The establishment of AFSC in April 1961, however, and national leadership's intimate involvement in the decision, solidified this structure for the long term. Although air-centric research and development remained in place at Wright Patterson Air Force Base (AFB), Ohio while the Air Force's space-centric R&D activities stayed in Sunnyvale, California, the California complex became something much more than its air counterpart in Ohio.

Generally, aircraft and aircraft-related systems, following development moved into operationally focused organizations—flying squadrons, wings, etc.—which then employed and maintained these systems en mass. The Air Force's burgeoning space assets, however, were highly specialized systems, produced individually and operated for limited duration. Not only was there no operational space infrastructure to accept these assets once they were built, establishing such an infrastructure, totally disparate from its R&D feeder, made little fiscal sense at the time. Consequently, the Air Force's R&D space center naturally evolved into the Air Force's operational space center as well,

[110] *AFIPL Supplement,* no. 110, 32.

crafting requirements, garnering funding, designing, developing, and testing, but also launching and flying (from nearby Vandenberg AFB) all that the Air Force put, or supported putting into space. Moreover, all of these activities were conducted in relative isolation from the broader Air Force and its atmospheric-bound activities. This was the organization for which the Air Force Space Plan was written and into which the Air Force's space-related resources poured.

Satellites were its primary focus. In 1961, the MIDAS satellite system, the remaining third of the WS-117L program still in Air Force hands, was beginning to take flight. In May 1962, under McNamara's direction, the Air Force's space complex took full responsibility "for development, production, and launch of all space devices necessary to establishment and progressive improvement of DoD communication satellite systems."[111] On the near horizon or in various stages of early development by the close of the Kennedy administration were weather, navigation, and sensor-detection satellite systems.[112] And in February 1962, just days following John Glenn's historic space flight, McNamara enticed the Air Force to begin planning a manned orbiting "space laboratory to conduct sustained tests of military men and equipment under actual environmental conditions, impossible to duplicate on earth."[113] The laboratory would never fly, but all of these other satellite programs would emerge and operate under this organization's aegis in the coming years.

Space launch and space support were other areas of growth for the Air Force's California space center. In the spring of 1961, planning began for a standardized Titan

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[111] Berger, *The Air Force in Space: Fiscal Year 1962,* 67, as quoted from memo.

[112] *Air Force Space Plan*, 63-70.

III launch vehicle to lift Air Force payloads of 5,000 to 25,000 pounds into low earth orbit. It was to become "a DC-3 for Space."[114] In order to detect and track all of these orbiting systems, space command and control infrastructure also emerged and proliferated during the Kennedy years.[115]

Lastly, secretly infused within this organization—behind certain doors and down discrete hallways—was the Air Force's support arm of the NRO. With Kennedy's affirmation of this deep black agency in early-September 1961, it too became intimately wedded to, though not managed by, the Air Force's organizational space structure. Air Force personnel carved from the space complex's resources provided a vast proportion of the NRO's expertise and experience. Indeed, during the Kennedy administration, Air Force space personnel hidden within the NRO were more active launching, tracking, and recovering operational satellites than their counterparts within the Air Force's visible space community were. Sixty-six of the 109 Air Force space launches made from Vandenberg AFB during Kennedy's presidency, or 61%, were actually conducted under NRO authority.[116]

Thus, though it began germinating during the Eisenhower years, with Kennedy's approval of the AFSC space development complex and his reaffirmation of the NRO, a space community burgeoned within the Air Force, and from it, a distinct subculture took

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[113] Letter, McNamara, Robert F., to Eugene M. Zuckert, 22 Feb 1962, subj: "AF Manned Mil Space Prog," as cited in Berger, *The Air Force in Space: Fiscal Year 1962,* 36.

[114] Berger, *The Air Force in Space: Fiscal Year 1962,* 43.

[115] *Air Force Space Plan*, 75-76. See David Christopher Arnold, *Spying From Space: Constructing America's Satellite Command and Control Systems,* (College Station, TX: Texas A&M University Press, 2005) for complete history of these developments.

[116] Of these 66, 54 were Corona flights and 12 were SAMOS flights. Launch data extracted from Tina D. Thompson, ed. *Space Log 1996,* Vol. 32 (Redondo Beach, California: TRW, 1997), 69-81. Corona-specific data extracted from Curtis Peebles, *The Corona Project: America's First Spy Satellites*

root. Its people migrated between the visible and hidden world of space development and operations, but short of a small number of senior leadership positions, there was little interaction between this section of the Air Force and rest of the of the service. Consequently, an unseen but palpable organizational divide formed between the smaller, specialized group of Air Force personnel who dealt with space, and the remainder of the service whose focus was wedded to atmospheric-bound pursuits. This divide was further accentuated by the fact that those who were air-bound could focus on warfighting. Those space-bound could not.

Amidst this environment, the Dyna-Soar program remained an anomaly. Had it been cared for, it may have come to challenge the Air Force's structural division of air and space. Instead, the Air Force's only truly aerospace program withered on the vine.

DYNA-SOAR'S DEMISE

In early June of 1961, not quite five months into the Kennedy presidency, NASA and the DoD jointly published a summary pamphlet describing the National Space Program. The pamphlet listed Dyna-Soar alongside Apollo and Mercury as one of the nation's three manned space programs. Moreover, the description it offered captured the program's aerospace focus: "To develop and demonstrate flight of a maneuverable manned glider, boosted into orbit, thru reentry and safe landing."[117] June 1961, though, was Dyna-Soar's heyday. In retrospect, the program was three steps from the grave.

(Annapolis, MD: Naval Institute Press, 1997), 277-293, Appendix 1. SAMOS data from Peebles, 133-4. The Air Force also made three launches from Cape Canaveral, Florida during this period for a total of 112.

[117] "National Space Program," 3 June 1961, Pamphlet, Department of Defense and the National Aeronautics and Space Administration, in Jeffrey Richelson, ed. *Military Uses of Space, 1945-1991,* Washington, D.C.: NSA, 1991, No. 00325, Microfiche, 6.

The first of these was the most significant, and came very soon after the pamphlet appeared. Political pressure and perceived resource opportunities in the wake of Gagarin's spaceflight in April turned the Dyna-Soar program team toward looking for ways to accelerate its development. On 26 June, the program's managers submitted a "streamlined" proposal that trimmed its suborbital test phase down to the bare minimum, eliminated manned suborbital testing altogether, and proceeded as quickly as possible to manned orbital flight.[118] The idea circulated around the air staff while the Air Force Space Plan was being drawn up and was included therein when that publication was approved in September. In the summer of 1961, under the Air Force's new guard and in tune with the times, Dyna-Soar was shedding its aerospace character.

In February 1962, during annual budget deliberations, Secretary McNamara approved Dyna-Soar's "streamlined" development plan as the Air Force had sought. He directed that its suborbital program be terminated and that the program proceed straight into orbital flight. This now made Dyna-Soar a *space* vehicle. However, with the administration recommitted internationally to a space for peaceful purposes policy, as a space vehicle, Dyna-Soar also had to shed its military focus. The second step: McNamara insisted now that the Air Force rename the program "to a nomenclature more suitable for a *research* vehicle."[119] On 19 June, the service complied; Dyna-Soar was

[118] Clarence J. Geiger, "Strangled Infant: The Boeing X-20A Dyna-Soar," in *The Hypersonic Revolution: Eight Case Studies in the History of Hypersonic Technology.* Vol. I: *From Max Valier to Project PRIME (1924-1967),* ed. Richard P. Hallion, 185-377 (Wright-Patterson Air Force Base, OH: Aeronautical Systems Division, 1987), 254-7; Roy Franklin Houchin, II, "The Rise and Fall of Dyna-Soar: A History of Air Force Hypersonic R&D, 1944-1963" (Ph.D. diss., Auburn University, 30 August 1995), 287.

[119] Clarence J. Geiger, *History of the X-20A Dyna-Soar,* October 1963, Air Force Systems Command, Aeronautical Systems Division, Information Office, Historical Division, 93 (available at Air University Library, Maxwell A.F.B, AL, Document Section, M-U 37052-22 1963 no. 50-I).

redesignated the X-20.[120] Thus, within a year's time, the program had slid from being a manned aerospace weapons system, to a manned space research vehicle.

With space peaceful and NASA preeminent, step three was now inevitable. On 19 January 1963, McNamara, as he was known to do, directed the Air Force to conduct a cost comparison between the X-20 and NASA's budding Gemini program.[121] The technological differences between the two were obvious: Gemini capsules would fall from space and plop into the ocean; the X-20 would descend, maneuver, glide, and land upon a runway of the pilot's choosing. However, with the primary purpose of both programs now oriented on the research of orbital maneuverability, space docking, and man's endurance in space, the writing on McNamara's fiscally focused wall was clear. Dyna-Soar was doomed.

Interestingly, the Air Force had seen much of this coming. Two years earlier, and just three days after Kennedy's UN speech in September 1961, General LeMay wrote Secretary Zuckert about a conversation he had recently had with McNamara. LeMay informed Zuckert that "the [defense] secretary seriously questioned whether Dyna-Soar represented the best expenditure of national resources."[122] Also telling during the two years thereafter, is what was not said.

As the Dyna-Soar program started sliding, there is no evidence in the historical record indicating that Schriever or anyone from the Air Force's space community rallied to support it. Indeed, an in-house study directed to examine organizational and program inefficiencies within AFSC, deemed in early 1963 that the Dyna-Soar program's "central

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[120] Geiger, *History of the X-20A,* 107.

[121] Geiger, *History of the X-20A,* 113.

[122] Geiger, *History of the X-20A,* 87.

problem [was] the open conflict between the Space Systems Division and the Aeronautical Systems Division for control of the only Air Force, manned space program."[123]

Dyna-Soar was lost on internal and external counts. In an Air Force organized for air and space, an *aerospace* system had no advocate. In a nation committing itself to peaceful space, a *weapon* system—space or aerospace—had no hope.

On 23 October 1963, Secretary McNamara visited AFSC research facilities in Denver, Colorado. He had asked General Schriever for a briefing on the X-20 program. The general informed both his Air and his Space Systems Divisions of the secretary's visit and of his briefing request but, apparently, offered no specifics about what information the defense secretary may have been looking for. As a result, the program managers from the Air Systems Division presented a basic update briefing on the X-20's progress. At its conclusion, McNamara grilled the team rather pointedly on the program's objectives. He "wanted to know what was planned for the Dyna-Soar program after maneuverable re-entry had been demonstrated. He insisted he could not justify the expenditure of about $1 billion for a program which had no ultimate purpose."[124]

FINISHING TOUCHES

At 12:30 pm on 22 November in Dallas, Texas, President John F. Kennedy was assassinated. As that tragedy unfolded, the United Nations Outer Space Committee held a one-day meeting in New York and abruptly decided "to wrap up in a single package the elements so far agreed upon with respect to the general legal principles that should

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[123] Geiger, *History of the X-20A,* 112.

govern the use of space."[125] Three weeks later, the committee's proposal, crafted on the day of Kennedy's death, came before the UN General Assembly.

The Assembly adopted UN Resolution 1962, "Declaration of Legal Principles Governing Activities of States in the Exploration and Use of Outer Space" unanimously on 13 December. All UN parties "solemnly declared" that outer space (and the celestial bodies within) was now "free for exploration and use by all States… in accordance with international law… for the benefit and in the interest of all mankind, [and was] not subject to national appropriation… by any means." Further activities therein were to be carried out "in the interest of maintaining international peace and security and promoting international cooperation and understanding." States would bear "international responsibility" for their activities in outer space, would register all launched objects, and so doing, would retain jurisdiction, control, and liability over them. Finally, every nation agreed to "regard astronauts as envoys of mankind," and to "render to them all possible assistance in the event of accident, distress, or emergency landing."[126]

Coincidentally, only three days before, Secretary McNamara officially cancelled the Air Force's Dyna-Soar program.[127] Thus, the week that NASA's astronauts became recognized throughout the world as peacemakers and "envoys of mankind," the Air Force's pilots, as warriors and envoys of violence, were henceforth confined to the

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[124] Clarence J. Geiger, *History of the Aeronautical Systems Division: July-December 1963* Vol. III: *Termination of the X-20A Dyna-Soar (Narrative)* (Alexandria, VA: Defense Technical Information Center, 1982), 11-13.

[125] Dodd L. Harvey and Linda C. Ciccoritti, *U.S. – Soviet Cooperation in Space* (Miami, FL: University of Miami, Center for Advanced International Studies, 1974), 165.

[126] UN General Assembly Resolution 1962 (XVIII), Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, 13 December 1963, 1-2 (accessed 26 Nov 2004); available from http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_18_1962.html.

[127] Hays, 197.

atmosphere. Aerospace, in concept, remained acceptable. Aerospace in practice, however, would never be—at least not on the Air Force's terms.

The day before he was killed, President Kennedy was in San Antonio at Brooks Air Force Base where he gave the final speech of his life. His reason for being there and the closing thoughts of the address he delivered highlight, in retrospect, a subtle irony. Dedicating the opening of new academic facilities at the Air Force's School of *Aerospace* Medicine, the president turned to literature to establish an analogy.

> Frank O'Connor, the Irish writer, tells in one of his books how, as a boy, he and his friends would make their way across the countryside, and when they came to an orchard wall that seemed too high and too doubtful to try and too difficult to permit their own voyage to continue, they took off their hats and tossed them over the wall—and then they had no choice but to follow them.
>
> This Nation has tossed its cap over the wall of space, and we have no choice but to follow it. Whatever the difficulties, they will be overcome. Whatever the hazards, they must be guarded against. With the vital help of this Aerospace Medical center, with the help of all those who labor in the space endeavor, with the help and support of all Americans, we will climb this wall with safety and with speed—and we shall then explore the wonders on the other side.[128]

This wall of space, however, was not one upon which America had stumbled. Rather, it was a wall designed by Eisenhower and erected by Kennedy—with measured and deliberate intent. In the mind of these two presidents, America's security demanded that air and space be separated. And their choice, quite understandably, could not but influence how America's airmen came to perceive their domain of responsibility.

[128] John F. Kennedy, president, "Remarks at the Dedication of the Aerospace Medical Health Center," Address, Brooks A.F.B., San Antonio, TX, 21 November 1963, 2 (accessed 3 September 2005); available from http://www.jfklibrary.org/jfk_san_antonio_11-21-63.html.

Epilogue

Whither Aerospace?

In the early months of the Kennedy presidency, the aerospace concept's institutional progress within the Air Force markedly slowed. With General White's retirement, the concept lost its most impassioned and influential advocate. With the establishment of Air Force Systems Command, the key organizational area within the Air Force from which the concept might have been propelled further toward operational reality instead adopted a structure that perpetuated the concept's bifurcation. Meanwhile, beyond the Air Force's border, President Kennedy affirmed NASA's leading role in the nation's visible space program, the NRO's role in its hidden program, and his intent to continue with Eisenhower's space for peaceful purposes policy. Thus, not a year beyond Kennedy's election, the aerospace concept's prospects within the service had eroded considerably and the service's external context—despite early indications to the contrary—remained fully supportive of the development.

By the close of 1963, the concept's progress had come to a halt. Dyna-Soar's death saw the last Air Force resources dedicated to enabling aerospace evaporate. UN Resolution 1962's birth saw the notion of space as a distinct and peaceful place become an international reality. Importantly, however, in spite of all of this activity the aerospace concept survived.

In a full-scale overhaul of the service's basic doctrine, initiated in March 1963 by General LeMay and approved for release finally on 14 August 1964, the Air Force chose to retain its single medium concept.[1] The new *Air Force Manual 1-1* "set forth the fundamental principles for employment of USAF aerospace forces in support of national objectives," and described aerospace as "the region above the earth's surface, composed of both atmosphere and near-space [that] provides a unique medium for military operations. Unlike land and sea military environments, aerospace comes in contact with all points on the surface of the planet."[2]

Additionally, throughout the Kennedy presidency, Air Force leaders continued on occasion to leverage the idea. "As we reach higher and farther," LeMay told an audience at the annual Air Force Association convention in September 1961, "…we must maintain our unity of mission and unity as an organization as we approach our operational tasks in space. We must keep firmly in mind that fact that aerospace power is indivisible."[3] Secretary Zucker, to the Los Angeles Chamber of Commerce in March 1962, said, "The overriding importance of the aerospace as a medium of military operations, the infinite extension of the medium of airpower, should jar loose whatever encumbrances of tradition and prejudice might slow our progress."[4] President Kennedy himself even employed the term at one point. "In the years that have passed since your founding," he

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[1] Robert Frank Futrell, *Ideas, Concepts, and Doctrine,* Vol. 2, *Basic Thinking in the United States Air Force 1961-1984* (Maxwell Air Force Base, AL: Air University Press, December 1989), 192, 715-6; Johnny R. Jones, Lt Col, *Development of Air Force Basic Doctrine* (Maxwell AFB, AL: Air University Press, April 1997), 10.

[2] Department of the Air Force, Air Force Manual (AFM) 1-1, *United States Air Force Basic Doctrine,* 14 August 1964, iii, 2-1.

[3] Department of the Air Force, Director of Information Services, Office of the Secretary of the Air Force, *Air Force Information Policy Letter* (hereafter *AFIPL*) XV, no. 21, 1 Oct 1961, 2.

[4] Department of the Air Force, Director of Information, Office of the Secretary of the Air Force, *AFIPL Supplement for Commanders*, no. 110, September 1962, 29.

stated in a letter to Air Force Association members, “airpower has become aerospace power and both its capabilities and responsibilities have taken a quantum leap.”[5]

The word also found its way into some of the Air Force’s mainstream organizational nomenclature. The Air Force’s School of Aerospace Medicine, that Kennedy helped open in November 1963, was one example. Others appeared within the Strategic Air Command (SAC). As ICBM systems started moving from the development world toward the front line, operational missile wings began to emerge. SAC’s commander, General Thomas S. Power, organized these units alongside existing bomber wings and under the Strategic *Air* Divisions that oversaw them. Power then directed that these divisions be renamed—“in line with Headquarters Air Force policy to use the term ‘aerospace’”—as Strategic *Aerospace* Divisions.[6]

Yet, something had changed. The notion that air and space constitute a single indivisible continuum had begun to assume more of a rhetorical quality than a literal one. SAC’s Aerospace Divisions, for instance, described organizations made up of two separate and distinct wings, one of airplanes and one of missiles. General Power, in fact, suggesting to an audience in May 1962 that SAC was becoming “a strategic aerospace command,” commented that it “…must continue to provide our principal military deterrent, regardless of whether it operates in the air or in space.”[7] Aerospace had become an acceptable notion to articulate broadly the air and space media collectively.

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[5] Department of the Air Force, Director of Information Services, Office of the Secretary of the Air Force, *AFIPL* XV, no. 22, 15 October 1961, 2.

[6] Norman Polmar and Timothy M. Laur, eds., *Strategic Air Command: People, Aircraft, and Missiles* (Baltimore, MD: The Nautical and Aviation Publishing Company, 1990), 80.

[7] Department of the Air Force, Director of Information Services, Office of the Secretary of the Air Force, *AFIPL* XVI, no. 9, 1 May 1962, 1.

In other words, rather than falling out of vogue or fading away against a context that, during the Kennedy administration, had clearly come to see space as a distinct entity, the aerospace concept adopted a shade of meaning that enabled it to comfortably co-exist with that context. Secretary Zucker, in a February 1962 speech, provides good example of this subtle shift.

> Now what does space have to do with national defense, and why should the Air Force have such great interest in space? In the first place, *space is a medium for possible action.* Therefore, operating problems in outer space must be considered as an extension of those in air space. That is why you hear the term "aerospace power" in Washington.[8]

In short, by the end of 1963, the concept was still evident and very much in use. However, it had become more of a rhetorical idea than a literal one, employed broadly to capture the air and space environs of the Air Force's responsibility, with a tacit concession that it fell short (for the time being anyway) in describing that environment realistically.

At this point, aerospace had attained a verifiable level of objectification—implicit in the service's theory, perpetuated in its doctrine, and consistently employed in everyday language, the idea garnered a substantial degree of consensus within the Air Force. However, awareness within the organization of the concept's inability to characterize the Air Force's domain credibly and accurately kept its personnel conscious of the concept's limitations. Under these conditions, full and unquestioned acceptance of the notion that air and space constitute a single indivisible whole could not occur. In other words, by the end of 1963, the institutionalization of the aerospace concept within the Air Force had stopped short of the process's sedimentation phase, where a complete consensus around

[8] *AFIPL Supplement*, no. 110, 28. Emphasis mine.

the idea would emerge, and where the organization and its actors would come to embrace, embody, and act within the framework of an aerospace-based reality.

During the forty some odd years that span the interregnum between the end of the Kennedy administration and today much, of course, has happened. Where this study is concerned, however, the continuities that remain are far more significant. The external and internal dynamics that created the conditions in 1963—arresting the aerospace concept's institutional progress without eroding its acquired stature—have since held relatively constant. Only retrospectively, therefore, can we see that the end of the Kennedy presidency marks the period where the aerospace concept's institutional development stalled.

The cold war is long over, but the internationally accepted perspective on space that this conflict engendered remains firmly entrenched. UN Resolution 1962, adopted less than a month after Kennedy's death, became the opening eight principles of the Outer Space Treaty approved three years later by the UN General Assembly. Since then, 98 nations have ratified it as the United States Senate did on 10 October 1967, the day the treaty officially entered into force.[9] Today the Outer Space Treaty remains in effect serving as the backbone of a *res communis,* space for free and peaceful purposes international legal regime.

America's national space policy followed a similar course. History provides quiet testimony to Eisenhower's influence—his last space policy product, signed in January

[9] United Nations Office at Vienna, Office for Outer Space Affairs, "United Nations treaties and principles on outer space, Addendum: Status of international agreements relating to activities in outer space as at 1 January 2004," 8-15 (accessed 29 October 2005); available from http://www.oosa.unvienna.org/SpaceLaw/treatystatus/ST_SPACE_11_Add1_Rev1E.pdf.

1960, stood unaltered over the next four presidential administrations.[10] Thereafter, every president since Jimmy Carter has updated it, yet each has remained committed to this policy's most fundamental principle: "the continued development of a legal regime for space that will assure its safe and peaceful use for the benefit of all mankind."[11]

The dynamics of the interagency competitive climate, within which the Air Force has competed for its resources, has also remained relatively constant with respect to this study's focus. NASA and the NRO have stood as the key agencies of the nation's civilian-led space program, while the Air Force has continued to maintain primary responsibility for developing and operating the military space component of this program. The Army and the Navy have remained involved in space to varying degrees but have never again posed a serious challenge the Air Force's lead role.

Finally, where general technology developments are concerned, nothing has emerged since the early 1960s to change fundamentally the way nations, air forces, and men get to and from space. Space Shuttle development, to a certain extent, furthered aerospace-related technologies, and interest in hypersonic space plane programs has ebbed and flowed over the past 40 years. However, within a national infrastructure organized for air and space, aerospace technology advancement, in its pure sense, has always lacked

[10] John M. Logsdon, "The Evolution of U.S. Space Policy and Plans," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program,* vol. I, *Organizing for Exploration,* ed. John M. Logsdon, 377-393 (Washington, D.C.: NASA History Office, 1995), 388.

[11] Zbigniew Brzezinski, Presidential Directive / NSC-42, "Civil and Further National Space Policy," 10 October 1978, in Logsdon, ed., *Exploring the Unknown,* Vol. I, 576. National Space Policy documents of presidents thereafter include "NSDD-42, 'National Space Policy,' 4 July 1982 (Reagan's), "Presidential Directive on National Space Policy," 11 February 1988 (G. H. Bush's), "National Space Policy," 19 September 1996 (Clinton's). G. W. Bush, as of this writing, had yet to release a national space policy.

organizational advocacy. Consequently, such development has always had difficulty sustaining momentum.[12]

Within the Air Force, the organizational dynamics apparent in 1963, which restricted the aerospace concept's further penetration, also share a strong continuity with today's service. The structural and cultural separation of air and space, burgeoning in the early 1960s, has perpetuated and strengthened since. By 1982, space systems and operational activity had proliferated within the Air Force enough to justify establishing the Air Force Space Command dedicated to managing the service's space responsibilities and personnel. In 1993, Air Force Systems Command and Air Force Logistics Command reintegrated into Air Force Materiel Command, and the R&D community at last relinquished its operational role in satellite control and space launch activities.[13] Today, Air Force Space Command has responsibility for the Space and Missile Systems Center, still active since its beginnings as the Western Development Division, and still resident in Los Angeles. Air Force Materiel Command is responsible for the Aeronautical Systems Center, still located in Dayton, Ohio. Furthermore, the Air Force's relationship with the NRO, in terms of personnel and technical support, has remained essentially intact since 1963. Thus, the space sub-culture that arose within the Air Force in the early 1960s remains alive and well today—perpetuated by the same structural dynamics and made up

[12] See Rebecca Grant, "Is the Spaceplane Dead?" *Air Force* 84, no. 11 (November 2001): 68-72; and Thomas A. Heppenheimer, "Origins of Hypersonic Propulsion: A Personal History," *Air Power History* 47, no. 3 (Fall 2000): 14-27.

[13] David N. Spires, *Beyond Horizons: A Half Century of Air Force Space Leadership* (Peterson AFB, CO: Air Force Space Command, Spring 1995), 274.

of people who transit most of their career largely between the Air Force's traditional military space activities, the NRO, and its operational missile organizations.[14]

Space, by 1963, had become legally, politically, organizationally, and technologically separated from the atmosphere, and it remains so in each of these respects today, for much of the same reasons. Similarly, however, the conditions supporting the aerospace concept's perpetuation in 1963 have also endured.

The most visible of these has been the idea's continued support within Air Force doctrine. The choice in 1958 to adopt the aerospace concept as an official service position and to infuse the notion throughout the Air Force's basic doctrine manual has withstood multiple revisits. Between then and 1996, the Air Force conducted five revisions of this core organizational document—in 1964, 1975, 1979, 1984, and 1992—to account for evolving nature of Air Force capabilities and employment concepts. Each time, the service chose to remain wedded to the perspective that air and space form a single, indivisible continuum. Given the organization-wide review process that such revisions are subject to, each decision to continue embracing the concept also speaks to the basic perspectives held over time by senior leaders throughout the Air Force. Basic doctrine is approved and published only after it has circulated and gathered consensus from commanders throughout the organization.

More constant still has been the aerospace concept's underlying justification. Air power theory has continued to define the Air Force's philosophical underpinnings and this body of thought continues to prescribe an approach to warfare that holds control of the vertical realm above the surface paramount—irrespective of the realm's physical

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[14] See Kevin J. McLaughlin, "Military Space Culture," Appendix 2, Staff Background Papers, of *Report of the Commission to Assess United States National Space Management and Organization* (11

properties. While the theory has undergone refinements since the early 1960s, its basic premise has remained unchanged, and aerospace therefore has remained an implied and inherent concept within that premise.

Thus, for the purposes of this study, the end of 1963 marks a sufficient stopping point for its historical inquiry. Until that point, the internal and external variables influencing the aerospace concept's institutionalization were fluctuating and dynamic. Since then, their effects have remained relatively constant, and the aerospace concept, consequently, has been captured in a state of suspension. Thus far, this study has described how this perspective developed. It is now appropriate to step back to understand a little better why this occurred.

January 2001). Prepared for U.S. Congress, Joint Committee on Armed Services.

Chapter 8

Answers, Insights, and Extrapolations

In the field of modern strategy, time tends to deal severely with concepts as well as facts.

—Bernard Brodie
Strategy in the Missile Age (1965)

The first appearance of the word "aerospace" in 1958 belies the fact that the concept had been evolving within the Air Force since the end of World War II. Although it never had a name, the airman's notion that his operational domain extended beyond the atmosphere was a natural and logical assumption within the framework of his theory. It is also traceable as far back as 1944, when technology was forecasting with reasonable promise that the idea might be a realistic one. Yet, this history shows that there were more variables influencing this idea's institutionalization than simply technology and theory. Within the Air Force, we have seen that leadership focus and organizational structure also played significant roles in the concept's long-term prospects. Outside of it, international tensions, national policies, resource competitors and broader technology trends all shaped the process as well.

The previous five chapters detailed historically how this institutionalization process unfolded. This one extracts the lessons this history offers. It analyzes the body of evidence to parse its insights and broaden the understanding of how ideas take hold within organizations.

The chapter's first section examines each of the study's eight independent variables—four environmental and four internal—individually. These discussions summarize and illuminate how, over time, each factor influenced the aerospace concept's institutionalization within the Air Force. The chapter's second section aggregates these analyses and answers this paper's specific research questions: Why does the aerospace concept persist? And given its staying power, why does it fail to stick? A final section addresses the study's implied inquiry: how do models that describe how institutions develop give us better insight into how ideas penetrate and embed within organizations?

VARIABLE ANALYSES

The following summary discussions focus upon this dissertation's eight independent variables. Each one reviews the evidence from the previous five chapters, pertinent to its particular variable, and analyzes over time that variable's specific influence on the aerospace concept's institutionalization. The environmental variables—*international security climate, relevant national policies, interagency competitive climate, general technology environment*—are examined first. Internal variable discussions—*leadership focus, theorizing, organizational structure, resource allocation*—follow thereafter. The aim of each discussion is to assess its variable, in the context of each chapter (or sub-period), as highly encouraging, encouraging, neutral, discouraging, or highly discouraging to the institutionalization process.

INTERNATIONAL SECURITY CLIMATE

An emerging and escalating cold war characterizes the backdrop of the international security climate throughout this study's 19-year period. Hardly apparent at the end of WW II, the cold war's influence increased as the Soviet Union expanded its power base, cut its ties with the West, and cordoned off its sphere of control. By the end of Truman's presidency, an iron curtain hung around an empire that had acquired the atom bomb, was pursuing nuclear parity, and supporting communist expansion on the Korean peninsula.

During the first five years of the Eisenhower presidency, the Soviet threat only intensified. Russia strengthened her military might, caught and passed America's thermonuclear program, and poured significant resources into the development of an ICBM capability. Meanwhile, Khrushchev twice rebuffed Eisenhower's overtures to reduce tension in the environment overhead, saying "no" to open skies and again to the president's first "space for peaceful purposes" proposal.

As a geographically vast, industry-based nation that was heavily reliant on a land army for its military strength, Soviet power was potentially well countered by a globally capable air force. Additionally, the Soviet Union's pursuit of space-enabling technologies, particularly in the 1950s, helped to encourage development of the same at home. Thus, from 1944 through October 1957 the influence of the international security climate on the aerospace concept's institutionalization within Air Force was encouraging at the outset and became increasingly so throughout.

The *Sputnik* event, however, introduced a new facet to this dynamic. On one hand, the appetite with which the American public devoured Khrushchev's post-*Sputnik* rhetoric provides sufficient evidence to indicate that the cold war threat, both real and imagined, merely intensified following the Soviet feat. On the other, the event also generated opportunities within the political arena—both domestically and internationally—for Eisenhower to begin building and reinforcing the perspective that space was a different place. Hence, though still encouraging to the aerospace notion's viability in part, the international security climate's aggregate effect on the concept's institutionalization had peaked and began around 1958 to assert an inhibiting influence on the process.

These discouraging influences from the international security climate increased over the next five years as "space for peaceful purposes" gathered mounting traction within the international community. Eisenhower, toward the end of his presidency, suggested before the UN that a peaceful space legal regime be adopted. Kennedy, a year later, committed to it and the rest of the world, over the next two years, followed suit. Cold war tensions continued to define this 5-year period as they had before. However, where the aerospace concept is concerned, these tensions were trumped by positive movement within the international community toward a regime framework for space that was fundamentally predicated upon treating it as a separate place. Thus, the international security climate became a discouraging influence on the aerospace concept's institutionalization during the final two years of Eisenhower's term, and was highly discouraging to it by the end of Kennedy's.

In sum, the effect of the international security climate upon the aerospace concept's institutionalization is characterized throughout the study period as follows:

	1944-52	**1953-57**	**1958**	**1959-60**	**1961-63**
Int'l Security Climate	Encouraging	**Highly encouraging**	Encouraging	Discouraging	**Highly discouraging**

RELEVANT NATIONAL POLICIES

The role of national policy early on in this study had both negative and positive influences on the aerospace concept's institutionalization process. Before 1947, however, policy neither encouraged nor discouraged the aerospace concept's development. The nation's civilian leadership was still finding its post-war footing on the international front, while domestically, drawdown and recovery had left little time for them to focus on or even care about fringe aerospace-enabling research programs underway within the military.

In mid-1947, however, with the cold war's emergence, the Truman administration turned to debating an appropriate national security strategy to combat it. Framing the debate, besides a growing sense of immediacy, was a limited resource pool brought on by an economic recession. Thus, the debate's focus was pulled inward toward real-time solutions, and a strategic, nuclear-capable "air force *in being"* arose as both a potent and economically viable force structure for national defense—a decision that had both positive and negative consequences for the aerospace concept. On the one hand, the security policy discouraged the idea's development because the policy's near-term focus and fiscally limited character ran counter to a concept that was both long-range in scope and expensive to pursue. On the other hand, because the policy validated the airmen's intellectual theory, it strongly supported the concept's theoretical foundation.

Three years later, after the Soviet Union acquired the atom bomb and the North Koreans "acquired" Seoul, national leadership found additional resources to increase defense funding significantly, some of which naturally found its way back into the Air Force's R&D programs. However, the Korean War generally continued to keep the nation's security strategy tuned to near-term considerations. Thus, throughout the

Truman years, national policy had a mixed or overall neutral influence on the aerospace concept's penetration within the Air Force.

Eisenhower's security approach was similar in character to Truman's in that strategic nuclear attack—or air power—remained its mainstay. However, by the time Eisenhower assumed office in 1953, a modernizing technology base and a more substantially equipped air force in being together offered him relief from many of the risks inherent with a forward-looking strategy. Eisenhower took advantage of this opportunity and designed a strategy that relied much more heavily on technological superiority than Truman's had. With strategic attack and technology sharing the New Look's focus, the national policy environment became an encouraging factor in the aerospace concept's institutionalization, and remained as such until *Sputnik.* That said, as Eisenhower's national space policy began to emerge in 1955, these dynamics started showing inklings of change.

Two aspects of national space policy that emerged prior to *Sputnik* would become relevant to the Air Force's developing perspective of the vertical later on. The first was the creation of Project "Aquatone," which wrested control of strategic reconnaissance away from the Air Force. While the U-2 was hardly a space platform, its recognized follow-on system, WS-117L, was, and Aquatone's organizational structure that held the Air Force in a supporting role would set a far-reaching precedence. The second aspect was Eisenhower's intent, signaled in NSC 5520, to establish the "peaceful purposes" of America's IGY satellite and to promote with it the concept of "the Freedom of Space."

Following *Sputnik*, what was largely conceptual in the mind of Eisenhower and his policy advisors beforehand with regard to space, quickly became ensconced in organizational structure, legislation, and a more mature national space policy. With the creation of ARPA and NASA, and with the approval of the CORONA program in the image of its U-2 predecessor, Eisenhower's policy decisions insured that every aspect of the nation's burgeoning space program fell under direct civilian control. Furthermore, in the NASA Act, Eisenhower legislated his intent to establish the peaceful and scientific purposes of America's civilian space program. Finally, NSC 5841 set as national policy an environmental paradigm recognizing the vertical not as an "aerospace" continuum but rather as two explicitly distinct regions—air space and outer space. Thus, in 1958, as national policy began to exert a perspective on space that threatened the Air Force's concept of the vertical with irrelevance, it became a distinctly discouraging influence on the concept's institutionalization. During the remainder of his presidency, Eisenhower only strengthened and solidified these policy decisions, and their influence, therefore becoming highly discouraging to the process.

Lastly, Kennedy not only affirmed, but also buttressed everything Eisenhower had constructed with regard to the nation's approach to space. Kennedy established NASA's preeminence for the long haul, approved the creation of the NRO, and secured international consensus for the space for peaceful purposes approach to space. His national policy decisions thus further strengthened the structures his predecessor created, which in turn enhanced their long-term prospects significantly. Less than a year into the Kennedy presidency, despite indications during his election campaign to the contrary, the relevant national policy variable had become entrenched as a highly discouraging influence on the aerospace concept's institutional potential.

In sum, the effect of the relevant national policies upon the aerospace concept's institutionalization is characterized throughout the study period as follows:

	1944-52	1953-57	1958	1959-60	1961-63
Relevant National Policies	Neutral	Encouraging	Discouraging	**Highly discouraging**	**Highly discouraging**

INTERAGENCY COMPETITIVE CLIMATE

Prior to Air Force independence, significant events and decisions among its resource competitors combined to create a climate that was highly encouraging for the aerospace concept. Although the concept was crafted from General Arnold's vision, it may well have remained confined to the pages of Arnold's 1945 report to Secretary Patterson were it not for the direct challenges that the other services posed to it. The Army's focus in rocketry to develop a strategic attack capability is what drove the Air Force into a guided missile program. As for the Navy, while its interest in rocket propulsion at this point was only concerned with basic research, its move toward satellite development sparked a strong response from Air Force leadership, which in turn generated the RAND report and drove the Air Force into its early satellite efforts.

Following Air Force independence, the Army's ongoing focus on missiles continued to highly encourage the concept's institutional development. Von Braun's missile program led rocketry's advancement throughout the Truman years, but the program's ambitions stimulated airmen to defend their strategic attack "turf." Through 1952, despite two amendments to the Key West Agreement directed specifically at constraining Army missile responsibility to "tactical" systems only, the presence and nature of this stimulus increased in intensity as the Army's missiles moved further and further into the airman's strategic attack domain.

Naval influence in aggregate during the remainder of this period was counterbalancing. A year and a half after its initial satellite challenge, a bureaucratic move to claim exclusive rights on satellite development generated the airmen's first policy statement on what the Air Force's envisioned as its expanding realm: General Vandenberg declared in January 1948, "The USAF, as the service dealing with air weapons—especially strategic—has the logical responsibility for the satellite." In contrast, however, the Navy's supercarrier campaign to secure a foothold in the strategic attack role actually had a discouraging effect on the concept's development. The immediate nature of this challenge, by forcing Air Force leadership to focus on non-aerospace related budget battles, tended to discourage the aerospace concept's development.

In aggregate, the interagency competitive climate's influence, between 1944 and 1952, on the aerospace concept's institutionalization within the Air Force can be described as highly encouraging through most of the period but decreasingly so toward its end.

During the first five years of Eisenhower's presidency, the Army (and to a lesser extent the Navy) continued challenging the Air Force's interests beyond the atmosphere, which in turn continued to provoke Air Force responses. Redstone rockets, the IRBM fight, and budding satellite interests all stirred Air Force counter activities that encouraged aerospace penetration during this period. At the same time, however, two factors contributed to the declining influence of the Army's and the Navy's challenges. First, the Air Force, through the series of amendments to the Key West Agreement, gradually solidified its hold within DoD on the ballistic missile strategic attack mission. Second, as the Air Force's own aerospace-enabling programs—Atlas, WS-117L, and Bomi—gathered their own internal momentum, the interservice external challenges became increasingly less threatening to the airman's domain. Thus, between 1953 and

1957, the interagency competitive climate remained encouraging to the aerospace concept's institutionalization process but decreasingly so.

In *Sputnik's* aftermath, the dynamics of this environmental factor underwent a significant change. Standing service rivalries, long clear to the administration but publicly illuminated in the Johnson hearings, was a causal factor in the military losing its responsibility for space development. Policy-makers across America's political spectrum came to advocate the development of organizational structure to establish civilian control throughout the nation's emerging space program. Although the Air Force, by year's end, had gained space ground with respect to the other military services, over the broader picture of the national program, they suffered a net loss. NASA and the CORONA program had begun to siphon a large share of available resources, and ARPA was moved in to become the military's representative at the trough. Thus in 1958, the interagency competitive climate became discouraging to the aerospace concept's institutionalization.

During the final two years of Eisenhower's presidency, NASA gained additional momentum when it acquired the Saturn rocket program from ABMA. CORONA's timely success, meanwhile, led to the creation of the OMSS—the NRO's precursor—ensuring that all reconnaissance satellite programs would remain beyond the Air Force's realm of responsibility. During this period, however, the Air Force was also able to parry a coordinated interservice bid to establish a joint military space command. In the process, it reaped a significant harvest with Secretary McElroy's decision to end ARPA's role as a central overseer of the military's space program. In the aftermath of that decision, the Air Force recouped more organizational advantage relative to the other services than it had lost the year prior. Therefore, the interagency competitive climate in 1959-60 improved somewhat from the year before with respect to this study's focus, enough to consider it a neutral (versus discouraging) influence, but not enough to conclude it returned to an encouraging state.

The effects of Kennedy's policy decisions on the interagency competitive climate, however, ended any prospects of a return to favorable conditions. With his commitment to send American astronauts to the moon, NASA's position relative to all other space-related organizations skyrocketed, and for the long term. Kennedy's support in creating the NRO also solidified another of Eisenhower's aerospace-discouraging organizational legacies, and again, for the long term. Thus, by the end of 1963, this aspect of the Air Force's environmental context had migrated rather quickly to establish a highly discouraging influence on the aerospace concept's penetration into the Air Force.

In sum, the effect of the interagency competitive climate upon the aerospace concept's institutionalization is characterized throughout the study period as follows:

	1944-52	**1953-57**	**1958**	**1959-60**	**1961-63**
Interagency Competition	**Highly encouraging**	Encouraging	Discouraging	Neutral	**Highly discouraging**

General Technology Environment

The contextual factor of "general technology environments" accounts for technology advancements *external* to the Air Force (and irrespective of organizational motive) that advanced or hindered the general development of the aerospace concept's enabling capabilities. Of specific interest here is the progression of rocket propulsion, nuclear warhead weight and explosive power. Satellite and hypersonic technology were also important influences, however, the majority of development in these areas took place within the Air Force and thus will be addressed in more detail during the internal variable discussion.

Rocket propulsion is the most critical general technology element of concern. As RAND's first report made clear in 1946, the propulsion system was intimately linked to all of the aerospace-enabling technologies of the period. Without the rocket, ballistic missiles, satellites, and Dyna-Soar simply did not exist.

Rocket technology experienced growth throughout the entire period of this study and thus presented a steady encouraging influence on the concept's institutionalization. In December of 1944, American rockets could only propel a 500-lb. missile 11 miles downrange. Yet, just over four years later, rocketry had developed enough to put a man-made object—a *WAC Corporal*—into space for the first time in history. By the end of 1952, general advancements in the field had instilled enough confidence in missile advocates to begin pursuit of the larger Redstone and Atlas systems.

Between 1952 and 1957, America's rocket capability progressed from the initial test of a 500-mile capable Redstone system, to the final development stages of a nuclear tipped ICBM fleet. Indeed, within the first month of 1958, a *Jupiter C* rocket successfully propelled the country's first satellite into orbit. Thereafter, solid-fueled rockets emerged as a credible thrust system for still larger missiles and by the end of 1958, realistic plans were in place to build an entirely new class of rockets that in the coming decade, would propel American astronauts to the moon. Over the next five years, *Atlas, Vanguard, Thor, Agena, Delta, Redstone,* and *Titan* rockets would emerge from various national programs to propel payloads of up to 2,000 lb through and beyond the atmosphere. Unquestionably, the primary motivation for America's rocket development, particularly early on, however, lay in its potential as a weapon. In this sense, the progress of nuclear warhead technology also played an important role.

Early in the Truman period, the atom bomb was heavy and had "limited" explosive potential. It therefore offered little encouragement for missile programs due to the unrealistic thrust and accuracy requirements an operationally effective atomic missile would demand. However, beginning in the early 50s, the pursuit of fusion technology and its promise of lighter and more powerful warheads abruptly reawakened ICBM interest. Consequently, developments in nuclear warhead technology, while offering only very limited encouragement to the aerospace concept early on, by the end of Truman's term were aggressively starting to push the concept's development.

Under Eisenhower, the effect of these developments became more apparent. Following the Atomic Energy Commission's (AEC) successful test of its first thermonuclear device in November 1952, ballistic missile payload and guidance design requirements were significantly relaxed. This, in turn, breathed new life into missile advocates and development programs began proceeding with vigor. By 1956, the AEC was forecasting that within seven years a 1-megaton warhead would weigh only 600 pounds.[1]

By the early sixties, however, the influence of nuclear warhead technology had run its course where aerospace-enabling technology development was concerned. As ICBMs became operational, this aspect of technology took on a neutral character in terms of its influence upon aerospace-enabling technology. In sum, between rocketry and warheads, the general technology environment went from encouraging in the Truman years, to highly encouraging during the mid-1950's, to encouraging, though decreasingly so, from

[1] Norman Polmar and Thomas B. Allen, *Rickover* (New York: Simon and Schuster, 1982), 541. 1 megaton equates to 1,000,000 tons of TNT. For comparison, the atom bomb dropped on Nagasaki weighed 10,800 pounds and delivered an explosive equivalent of 23,000 tons of TNT while the Air Force's *Minuteman 1* missile, operational by October 1962, could deliver a 900-lb., 1 megaton warhead.

1958 through 1960. By mid-1961, the general technology environment had taken on a neutral character regarding its influence on the aerospace concept's institutionalization within the Air Force.

In sum, the effect of the general technology environment upon the aerospace concept's institutionalization is characterized throughout the study period as follows:

	1944-52	1953-57	1958	1959-60	1961-63
General Technology	Encouraging	**Highly encouraging**	Encouraging	Encouraging	Neutral

The four environmental variables just covered capture the relevant external forces that affected the aerospace concept's proclivity to take hold within the Air Force. They were indirect in their influence and lie beyond the Air Force's capacity to shape or control. Discussion now turns to this study's four internal variables, which affect the concept's institutionalization directly and are well within the organization's sphere of control. Once again, these variables are leadership focus, theorizing, organizational structure, and resource mobilization.

LEADERSHIP FOCUS

Prior to Air Force independence in the summer of 1947, its leaders played a highly encouraging role in the concept's development. As early as November 1944, external challenges from the Army's burgeoning missile program in combination with General Arnold's aerospace vision stimulated the concept's actual gestation. The year that followed saw it bloom as Arnold successfully passed his vision on to the next generation of Air Force leadership and their continued focus supplied it crucial nourishment. Senior-level actions directed the establishment of the concept's earliest technological programs and their bureaucratic maneuvering strengthened the service's hold on its strategic attack mission.

Following Air Force independence, however, the challenges facing Air Force leadership became complex and demanding, and these challenges pulled focus away from furthering the aerospace cause. Foremost on the service's plate were issues inherent with establishing an organizational foundation upon which it could independently function. Simultaneously, Air Force leaders also found themselves immersed in a stark reality. Building a nuclear capable strategic attack "force in being" while working to secure and maintain an equal footing astride its older sibling services was challenging enough. That these efforts occurred within a severely constrained fiscal environment made them daunting. And finally, after three years of energy-draining focus on such near-term matters, just as signs began appearing that the Air Force's leaders might finally be in sight of some breathing room, in June 1950 America became immersed in three more years of international conflict.

When required, attention was mustered to stave off threatening "land grabs" from the other services, as General Vandenberg showed with the policy statement that staked an Air Force claim to satellites in January 1948. However, outside of such extremes, a concept still far off into the future naturally found little encouragement within the general climate of the late 1940s and early 1950s. Thus, compared to its highly encouraging role prior to independence, leadership focus had a neutral influence on the concept's institutionalization during the last two thirds of the 1944-52 period. On average then, through the initial eight years of this study, the factor was mildly encouraging to the process.

With Eisenhower's election, the New Look unleashed resources that enabled Air Force leadership to recommit to previously curtailed aerospace-enabling technologies—specifically the ICBM, the WS-117L satellite program, and "Bomi." Beyond these programmatic decisions however, service leaders throughout the mid-1950s remained rather impartial with regard to issues that were relevant to the aerospace concept's development. While the service maintained its focus on ICBMs and strategic attack, space-related events of far-reaching consequence unfolded, seemingly unnoticed, right under its nose. The Air Force's RAND studies had long argued, but service leadership still failed to grasp, the nationally vital importance of the peacetime strategic reconnaissance mission. Yet, even after the U-2 was calved from the Air Force in the fall of 1954, as late as the summer of 1956 the ill-funded WS-117L languished as a low priority support system. On a broader level, Eisenhower's space policy emerged with little to no involvement or reaction from within Air Force headquarters. None of this indicated active discouragement of aerospace on the part of service leadership. Rather, this was consistent with inaction or inattention. Hence, during the Eisenhower years prior to *Sputnik,* the leadership focus variable was more a neutral influence on aerospace institutionalization than an encouraging one.

In July 1957, however, General Thomas D. White became the fourth chief of staff of the Air Force and three months later, the Soviet Union presented an opportunity for him to push an idea he had espoused at least since the early 1950s when he was championing satellite development as an air staff deputy chief. White's vision of the service's future beyond the atmosphere was a powerful one founded entirely on the notion that space was simply a now-reachable extension of the continuum in which the Air Force had long operated. He championed the aerospace concept within and beyond the organization, before it had a name, and had it infused in Air Force doctrine as soon as practical thereafter.

During the last two years of the Eisenhower administration, White's aerospace encouraging efforts only gained momentum. The idea diffused throughout the organization via all levels of Air Force leadership. Moreover, with Dyna-Soar, the service saw a weapon system that in the near future would make White's aerospace vision a realistically realizable one. Through an explicit information campaign, the concept also spread outward into American society—deeply and quickly enough in fact to be accepted for inclusion within a major American dictionary by the fall of 1960. In short, within weeks of *Sputnik,* leadership focus became a highly encouraging variable affecting the aerospace concept's institutionalization within the Air Force and remained increasingly so throughout the remainder of the Eisenhower presidency.

Six months into Kennedy's term, General White retired and the aerospace concept lost its staunchest advocate. Although other senior leaders by this point had now bought into the idea, including White's successor General LeMay, none matched the fervor with which White championed it. Additionally, environmental conditions were strongly indicating by this point that air and space was the perspective on the vertical that the nation was pursuing. That and the rise in stature of leaders within the Air Force, like General Schriever, collectively came to tame the influence that leadership focus had on the concept's institutionalization process. By the end of 1963, aerospace had become a rhetorical idea, encouraged still by service leadership, perpetuated in its doctrine, but no more so a term expressive of a realistic vision for the Air Force's future.

In sum, the effect of Air Force leadership focus upon the aerospace concept's institutionalization is characterized throughout the study period as follows:

	1944-52	1953-57	1958	1959-60	1961-63
Leadership Focus	Encouraging	Neutral	**Highly encouraging**	**Highly encouraging**	Encouraging

THEORIZING

The intellectual arguments justifying the aerospace concept appear in various forms throughout this history, implicitly and explicitly. Some periods in this study reveal more activity than others do, which follows a pattern somewhat related to that of the leadership focus variable. Yet, one facet of the theorizing factor permeates steadily and has an encouraging effect on the process throughout the entire study. Air power theory was (and remains) a constant source of implicit support to the aerospace concept's institutionalization.

Apart from forming the intellectual basis for the service itself, the theory provides the aerospace concept its relevant backdrop. Given that a capacity exists to operate above the earth's surface, air power theory holds that an overwhelming advantage is accrued to those in armed conflict who can control that realm—more specifically, control of the region above enables control of the surface below it. Thus, purely from the service's theoretical paradigm, the idea that there could be an upper limit to this region simply makes no sense. As the capacity to operate beyond the atmosphere extends, so too does the realm where air power theory applies. Consequently, the aerospace concept is implicit within, wholly consistent with, and a natural outgrowth of air power theory. In fact, aerospace may be considered as much a response as it is a position in its own right. Until those outside the air power sphere began to suggest that space was a different place, those from within it rarely recognized a need to argue otherwise. Aerospace was *a priori*.

Hence, the concept was recognizable only in its implicit form for the first thirteen years of its recorded existence.

General Hap Arnold was the first to justify the indivisibility of air and space more explicitly than air power theory did. His vision, expressed in his career end report to Secretary Patterson, was imbued with the concept. So too were his parting words in the Pentagon's auditorium to those who took his baton. By early 1946, Arnold had given the concept intellectual momentum.

The strength of Arnold's vision carried well beyond his retirement. It fueled the groundbreaking series of RAND reports—technical and political—that justified and furthered the viability of Air Force activities beyond the atmosphere. Arnold's vision was also the foundation for the Air Force's first aerospace-related policy statement, General Vandenberg's claim in January 1948 that the Air Force "has the logical responsibility for the satellite." Although arguments between 1944 and 1952 surfaced at times to discourage the concept's institutionalization—*Toward New Horizons*, for example, or Richard Leghorn's initial report on strategic reconnaissance—the theorizing variable during this period from 1944-1952 had a highly encouraging influence on the process.

Between 1953 and 1957, however, beyond the backdrop of air power theory, there was little to discern in terms of Air Force intellectual activity to justify the aerospace concept. The service was experiencing a huge growth in its aerospace technologies, but theory refinement (given these emerging capabilities) and further concept development was left utterly alone. Until late 1957, Arnold's vision of twelve years prior continued to be the Air Force's most far-reaching perspective into the future. While Eisenhower was developing his strategy of space for peaceful purposes, the Air Force continued to build its missiles. Theorizing during the Eisenhower years leading up to *Sputnik* was thus only moderately encouraging to the aerospace concept's institutionalization.

Following *Sputnik,* however, there was a significant rejuvenation of arguments from within the Air Force justifying its notion of a single operational medium. Service leadership made a deliberate decision to emphasize aggressively, and at every opportunity, the Air Force space mission. Indeed, during this period, the concept emerged for the first time in an explicit form when General White articulated it before the National Press Club. Four months later, the Air Staff coined the word and shortly thereafter, moved to have it and the idea it represented instilled throughout its basic doctrine.

The trends established during 1958 only strengthened during the remaining two years of the Eisenhower presidency. The concept became an official position of the Air Force, it was captured in the service's slogan, propagated throughout its organization, and pushed outward to the other services, Congress, and the public. The campaign to justify the idea was so effective, "aerospace" found its way into *Webster's* dictionary less than three years after it was coined.

Throughout the Kennedy years, active justification of the concept waned somewhat in comparison to the three years previous. Indeed, arguments appeared from within the service on occasion that ran counter to it, arguments that emanated largely from Trevor Gardner's Space Study report released in April of 1961. But by this point, the concept had become entrenched within Air Force doctrine, and it remained supported by air power theory as it always had been. In sum, over the study's three sub-periods covered between 1958 and 1963, the theorizing variable remained a highly encouraging influence on the aerospace concept's institutionalization within the service.

In sum, the effect of Air Force theorizing upon the aerospace concept's institutionalization is characterized throughout the study period as follows:

	1944-52	1953-57	1958	1959-60	1961-63
Theorizing	**Highly encouraging**	Encouraging	**Highly encouraging**	**Highly encouraging**	**Highly encouraging**

ORGANIZATIONAL STRUCTURE

At the entry point of this survey, the fall of 1944, organizational structure within the Air Force even remotely devoted to aerospace-related endeavors was simply non-existent. This variable, as well as its relevance to the concept's institutionalization process, was thus an emergent one.

Between 1944 and 1952, consistent with the infancy of the idea, aerospace-encouraging structures developed within the Air Force in relatively small steps and were exclusively related to research and development. General Arnold brought particular focus to the importance of R&D in the Air Force, highlighting it as a crucial mainstay of the air arm's future viability. Further, he established an R&D directorate within the air staff (headed by then Major General Curtis LeMay), which in turn pulled the RAND organization up onto its feet in the spring of 1946. Also significant during this period was the structural choice to disaggregate R&D from everyday logistics management; in January 1950, Air Research and Development Command (ARDC) became an independent command within the service. Although indirectly related to aerospace development, these organizational actions all provided early structure within the Air Force upon which the concept secured its initial purchase. Thus, they offered modest encouragement to the aerospace concept's institutionalization process.

Following Eisenhower's election, as national momentum built to develop the ICBM, ARDC established its Western Development Division (WDD) in Sunnyvale, California and selected Brigadier General Schriever to lead the Air Force's effort. Initially, the establishment of structure with a purpose to pursue rocket R&D was a highly encouraging development for aerospace. The positive influence from this development, however, would be short-lived.

In short time, Schriever's division became focused singularly on ICBM development. Then, in early 1956 and under strong protest from its commander, the division expanded to include the Air Force's IRBM and satellite programs. At the same time, however, Schriever was successful in excluding the "Bomi" project from his fold. Thus, while initially holding promise as a nascent organization within which the aerospace concept could be further nurtured, WDD became first a missile complex and then a missile and reluctant satellite complex. By 1957, it stood as the principal R&D facility within the Air Force, but it was beginning to be a discouraging influence to the aerospace concept. Assessing the entire four year period from 1953-57, organizational structure's influence was thus neutral overall but as *Sputnik* neared, was tending toward discouraging.

In April 1958, Schriever once again rebuffed the Bomi—now "Dyna-Soar"—team's request to join his organization. Instead, Schriever's Air Force Ballistic Missile Division (AFBMD), whose name changed from WDD the summer prior, proposed plans for a satellite-like alternative to the Air Force's lone aerospace system. Indeed, AFBMD even started recruiting Air Force personnel for its "space program." One aspect of organizational structure that shone as potentially encouraging to the aerospace concept's institutionalization process in 1958 was the findings of the Stever Committee. This study proposed to ARDC and the air staff that the service's R&D organization could be run more effectively if it were organized by stages of development rather than by the functional nature of its programs. Such a structure would facilitate rather than hinder an aerospace perspective. However, it was simply a proposal by this point and thus the aggregate effect of the organizational structure variable in 1958 had become discouraging to the concept's institutionalization process.

The aerospace-discouraging organizational structural arrangement worsened during the final two years of the Eisenhower presidency. The Stever Report's recommendations were effectively eschewed as Schriever tried, first within the Weapon System Study Group process and then on his own, to instead turn AFBMD into a military space development center. Leveraging the emerging political climate of the Kennedy-Nixon campaign, Schriever convinced White to approve the creation of the Air Force Space Study Committee and under Trevor Gardner's chairmanship, the committee put Schriever's organizational vision to paper. Organizational structure during this period thus became highly discouraging to the aerospace concept.

Shortly following Kennedy's election, Schriever's space center within the Air Force became a reality. Air Force Systems Command (AFSC) was created in April 1961 and the organizational divide within the Air Force between air and space was solidified. Space systems developed in California, air systems in Dayton, and aerospace systems had no organizational home. Furthermore, AFSC's Space Systems Division established close organizational ties with the NRO as a supporting agency, which further strengthened the air/space divide within the Air Force. By the close of the Kennedy presidency, the Air Force's organizational structure remained a highly discouraging influence on the aerospace concept's institutionalization process.

In sum, the effect of Air Force organizational structure upon the aerospace concept's institutionalization is characterized throughout the study period as follows:

	1944-52	1953-57	1958	1959-60	1961-63
Organizational Structure	Encouraging	Neutral	Discouraging	**Highly discouraging**	**Highly discouraging**

RESOURCE MOBILIZATION

Air Force resource decisions between 1944 and 1952 portrayed a mixed bag with respect to this analysis. Prior to the service's independence, Air Force money was earmarked and then spent to stand up the RAND project, which in turn developed the Air Force's earliest satellite proposals. So too were resources placed toward the service's first missile development contract. With independence, however, came a simultaneous budget squeeze and the early aerospace-enabling programs were among the first that the Air Force felled. Although NSC-68 restored the resource flow in October 1950, and ARDC in turn revived its missile effort, satellite development remained fallow. Throughout the eight year period prior to Eisenhower's election then, resource mobilization with respect to the aerospace concept was therefore mildly encouraging in aggregate.

Eisenhower's New Look, however, breathed life back into the kinds of programs that had the potential to make aerospace an operational reality. In April 1954, ARDC started funneling resources into the development of its "Bomi" aerospace platform. In May, the Atlas ICBM moved to the top of the Air Force's developmental priority list, which brought along with it a sharpened focus on rocket advancement in general. Six months later, the Air Force initiated formal development on the reconnaissance satellite. Although satellite and Bomi funding took a back seat to Atlas, during the Eisenhower years prior to *Sputnik,* the (re)birth and feeding of these programs characterized a highly encouraging resource mobilization environment where the aerospace concept was concerned. *Sputnik's* political effect, however, generated conditions that stemmed this encouragement.

The Soviet satellite launch invigorated all of the Air Force's exo-atmospheric related programs. Dyna-Soar received a significant resource boost, and so too did the WS-117L program. *Sputnik*, however, brought particular focus to Air Force satellite development. Indeed, in January 1958, the president elevated the development of the reconnaissance satellite to highest national priority. Also in the *Sputnik's* wake, out of AFBMD came a wave of more advanced space-focused studies and proposals, from manned satellite options to moon bases, all seeking to ride the momentum generated by the Russian's feat. Resource mobilization in 1958 thus had a double-edged affect on the aerospace concept's institutionalization. Encouraging in some respects and discouraging in others, the factor had a neutral influence overall during this period.

During the final two years of Eisenhower's time in office, resource expenditures within the Air Force began having a negative influence on the concept's institutionalization process. AFBMD became an increasingly influential development center but their resources were spent on decidedly space-centric programs. Dyna-Soar's progress, meanwhile, ebbed, flowed, and ebbed again. By the close of this period, political considerations had reduced it from a weapon system to a research vehicle and funding became increasingly tough to garner as a result. Resource mobilization had thus evolved to impart a discouraging influence on aerospace.

Finally, under the Kennedy administration, the discouraging trend only intensified. Air Force satellite programs, rocket development, and space infrastructure support systems proliferated, while Dyna-Soar continued to fight for organizational support. As a research vehicle, it was pushed into the orbital flight-testing realm where it competed against NASA programs that duplicated its newly refocused aims. In the end, McNamara cancelled the program and the Air Force correspondingly lost its lone aerospace-enabling platform. Resource expenditures within the Air Force and relevant to this study during this period had a highly discouraging effect on the aerospace concept's institutionalization.

In sum, the effect of Air Force resource mobilization upon the aerospace concept's institutionalization is characterized throughout the study period as follows:

	1944-52	1953-57	1958	1959-60	1961-63
Resource Mobilization	Encouraging	**Highly encouraging**	Neutral	Discouraging	**Highly discouraging**

Assembling the eight variable assessments together in the table below provides a broad overview, through the lens of an institutionalization process model, of the dynamics surrounding the aerospace concept's penetration into the Air Force. Note that the concept never developed beyond the objectification stage. Sedimentation, for reasons that will be addressed shortly, never occurred. Note as well that the environmental variables exerted an indirect effect on the process. The Air Force had little to no control over them and while they influenced organizational action—at times significantly—these variables did not describe organizational decisions or activity. In contrast, the internal variables did. These variables indicated Air Force choices and intent with respect to its concept, the organization had significant control over them, and hence, they affected the aerospace concept's institutionalization directly. The findings below provide a foundation from which to address this study's fundamental research questions.

Table 1 – Aggregate Variable Analyses

	1944-52	1953-57	1958	1959-60	1961-63
DEGREE OF INSTITUTIONALIZATION	***Habitualization*** *(early)*	*(advanced)*	***Ojectification*** *(early)*	*(moderate)*	stalled…
ENVIRONMENTAL VARIABLES					
Int'l Security Climate	Encouraging	**Highly encouraging**	Encouraging	Discouraging	**Highly discouraging**
Relevant National Policies	Neutral	Encouraging	Discouraging	**Highly discouraging**	**Highly discouraging**
Interagency Competition	**Highly encouraging**	Encouraging	Discouraging	Neutral	**Highly discouraging**
General Technology	Encouraging	**Highly encouraging**	Encouraging	Encouraging	Neutral
INTERNAL VARIABLES					
Leadership Focus	Encouraging	Neutral	**Highly encouraging**	**Highly encouraging**	Encouraging
Theorizing	**Highly encouraging**	Encouraging	**Highly encouraging**	**Highly encouraging**	**Highly encouraging**
Organizational Structure	Encouraging	Neutral	Discouraging	**Highly discouraging**	**Highly discouraging**
Resource Mobilization	Encouraging	**Highly encouraging**	Neutral	Discouraging	**Highly discouraging**

ANSWERS

Two research questions framed the theory's specific explanatory challenge. *Why does the aerospace concept persist?* And conversely, *given its staying power, what keeps it from sticking?* The data above suggests answers to both of them. Because the second question's response is more transparent, it is helpful to address that one up front.

WHAT KEEPS THE AEROSPACE CONCEPT FROM STICKING?

The Air Force's organizational structure and the way it mobilizes resources, both of which are attuned to and underscored by the service's external environment, perpetuate an air and space perspective that precludes the aerospace concept from becoming more institutionalized.

Organizational action is shaped by the structure that frames it. In this case, what Air Force people do every day is heavily influenced by how the Air Force organizes itself.

The service has developed structure that is directly antithetical to an aerospace perspective. Until the early sixties, this structure was emergent and malleable, but by 1963, its form had solidified. Today's structural arrangements are directly descendent there from, and they divide air and space explicitly. As a result, aerospace has no organizational residence within the Air Force, nowhere structurally to adhere.

How an organization mobilizes its resources is ultimately wedded to how it chooses to organize. Sections within the Air Force focused on space will design, advocate, budget for, and consequently acquire things related to space. Sections focused on air act similarly with respect to their own organizing perspective. Technologies, ideas, and alternatives that either fall within the seam or show promise of bridging it, tend to lie fallow. In other words, aerospace-like things fail to emerge or develop, and thus have no chance either to prove or disprove their value.

Consequently, at least since 1963, and emerging already before then, nowhere within the Air Force have its people been able to practice aerospace on a daily basis. Nowhere can they see it, touch it, feel it, or experience it. Instead, personnel in space-related organizations are dealing with things pertaining to space. Those in air-related organizations are doing the same with air. As a result, the mental maps, the images, the pictures in their heads are influenced similarly, and they cannot help but question the utility of a concept at odds with such a perspective.

This air and space paradigm, which Air Force structures and resource spending perpetuates, is only reinforced by the service's external environment. Although the international context is no longer framed by the cold war, the international space regime that this war constructed remains very much ensconced today, maintaining a clear and sharp divide between space and air. America's policy choices with respect to space, which were instrumental in this regime's construction four decades ago, continue to support it whole-heartedly. Finally, the agencies within government that compete against the Air Force for national resources also remain organized (and therefore focused) to uphold the air-space divide. This environment began emerging in the mid-1950s and became fully defined by 1963. Looking outward from within the Air Force today, anyone contemplating the relevance of the aerospace concept will find little evidence to support it. Moreover, the view has been the same for over forty years.

In sum, the aerospace concept fails to stick within the Air Force because today's "reality"—the organization, the tools, the policies, the laws—continues to render it a misconception. Factors, both internal and external to the Air Force mutually reinforce a perspective wholly antithetical to it, a perspective that emerged in the mid-1950s, was established by the close of 1963, and has remained so over the four decades since. Under such conditions, aerospace cannot evolve within the service into an unquestioned, fully embedded institution. Yet, while all of this would seem to suggest the concept should fade away into obscurity, it still lingers.

WHY DOES THE AEROSPACE CONCEPT PERSIST?

Air power theory, which provides inherent and constant justification for the concept and which the Air Force fully embodies, and to a lesser extent the consistent choice of Air Force leaders to perpetuate and leverage the concept's rhetorical value, together enable the aerospace concept to maintain a degree of partial institutionalization.

Of the two factors encouraging the aerospace concept's persistence, leadership focus plays a less important role. The influence of Generals Arnold and White within this story is unquestionable. Beyond its scope, General Ryan, whose aerospace-based organizational vision was highlighted in the introduction, offers a more recent example of a leader whose personal focus on aerospace has directly encouraged the idea's persistence. Outside of these specific three, however, the concept has generally enjoyed only tacit support from the Air Force's senior leaders. A 1988 perspective of General Thomas S. Moorman, Jr., who retired in 1997 as the Air Force vice chief of staff, captures this observation nicely. To understand the Air Force's organizational approach to space, he said,

> … you've got to understand that in the sixties and the seventies space was the province of the R&D community, and it was the R&D community that had a womb-to-tomb responsibility. The decision process by which space issues were decided was basically a civilian affair. That is the corporate leadership of the Air Force was not deeply involved, even though chiefs of staff from the earliest day had espoused space as an extremely critical mission and that space was just an extension of the air… aerospace. Probably you know that General Thomas D. White quote. Nevertheless, all that space business was kind of handled separately.[2]

The most significant ongoing influence of the leadership focus factor has been a sustained commitment through six full-scale revisions between 1958 and 1997 to support the aerospace concept's place within the service's basic doctrine. However, even this element of support has showed signs of erosion in recent years.

General Ryan's pro-aerospace assertion of the late 1990s was in fact a response to a counter move by his predecessor, General Ronald R. Fogleman. In the fall of 1996, General Fogelman endorsed an organizational vision statement that implicitly divested the service from the idea of aerospace. "We are now transitioning," the vision read, "from an *air* force to an *air and space* force on an evolutionary path to a *space and air*

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[2] Thomas S. Moorman, Major General, U.S. Air Force, Oral History Interview by Robert M. Kipp and Thomas Fuller, 27 July 1988, typed transcript, 1, K239.0152-1839, IRIS No. 1095229, in USAF Collection, Air Force Historical Research Agency, Maxwell Air Force Base, AL (hereafter USAF AFHRA).

force."[3] The italics are original and their intended meaning, to any airman reading them, was clear. This statement preceded a revision of basic doctrine published in September 1997 that saw the aerospace concept excised from its pages for the first time since 1959.[4] Ryan took Fogleman's place in the fall of 1997 and established his Aerospace Integration Plan Task Force the following spring to steer the service back toward its aerospace footing. General Jumper followed Ryan in the fall of 2001 and again turned the Air Force away from it.

The point of highlighting the recent flip-flopping among the Air Force's senior-most leaders with respect to aerospace is two-fold. On one hand, the fact that they are engaged in such a "conversation" indicates the depth of the concept's continued traction within the organization. On the other, the dialogue suggests that the leadership focus factor, though crucial to the concept's birth in the mid-1940s and its maturation in the late 1950s, is only of marginal significance to the concept's long-term persistence. Instead, this ebb and flow of leadership support highlights what is a much more significant and sustained source of encouragement for the concept's staying power: the influence of theory.

Air power theory, as a body of ideas, is itself fully institutionalized within the Air Force. The service was founded upon its premise, has been organized and funded around its prescriptions, and today fully embodies its tenets. The theory's name, however, is a misnomer.

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[3] Department of the Air Force, *Global Engagement: A Vision for the 21st Century Air Force* (Washington, D.C.: GPO, 1997), 7.

[4] This seventh revision rescinded the aerospace concept for the first time since the concept's inclusion therein. Air Force Doctrine Document 1, *Basic Air Force Doctrine* began referring to the service's operational realm as two separate media, air and space. See Department of the Air Force, Air Force Doctrine Document (AFDD) 1, *Basic Air Force Doctrine,* September 1997, 7.

Air power theory has little to do with air (or space), *per se.* It is a theory of warfare—operational in nature and focused on the dynamics of military force—that is based on positional advantage. Very simply, the theory posits that in a world constrained by gravity, to be above in battle confers the holder of that position a significant, or, some might argue, decisive advantage.

Within this intellectual construct, from a purely theoretical sense, the idea of aerospace is a natural and self-evident corollary. Indeed, it too has little to do with air and space, *per se.* The concept simply asserts that the airman's domain should not, cannot, must not have a ceiling. In its purest sense, aerospace was best captured before the ceiling problem became an issue, before the difference between the atmosphere and space became a political necessity. Recall again, how in the early 1950s, airmen *spatially* described their operational medium in the first edition of their basic doctrine manual:

> The nature of the medium of space gives to air forces a versatility not common to surface forces. The limitations imposed by the definitive boundaries of both sea and the land restrict the employment of surface forces, while air forces are free to engage or support land, sea, and other air forces. The medium of space allows air forces maximum opportunities for dispersal, concentration, and freedom of maneuver, and permits unparalleled observation of any point on the earth's surface. The most significant quality of this medium is the fact that it exposes to assault by the air vehicle the entire structure of a nation….[5]

The data suggest that aerospace persists within the Air Force to the degree it does today primarily because of its inherent and intimate connection to air power theory. Leadership focus has insured that the concept has remained an explicit idea within the Air Force, if only superficially. Meanwhile, the organization's personnel writ large, which understand and embrace the Air Force's foundational theory, cannot help but confront the

[5] Department of the Air Force, Air Force Manual (AFM) 1-2, *United States Air Force Basic Doctrine,* March 1953, 7.

concept intellectually. Exposed to a physical reality that says otherwise, aerospace is a questionable idea, even irrelevant to some. Yet, it continues to be questioned. Wedded as it is to air power theory, which itself is fully institutionalized, the aerospace concept cannot but persist, confronting the service's personnel with ongoing consistency. As such, it stands as an Air Force idea arrested in a state of partial institutionalization.

A key point mentioned at the outset of this study, however, was that the story's unfolding is more important than its outcome. This research is focused on process, rather than result. Its value rests not so much on distilling the causes of the aerospace concept's current predicament, but rather in understanding how this predicament came to be and in extrapolating this understanding into general insights about how organizations come to hold the ideas that they do.

INSIGHTS AND EXTRAPOLATIONS

The aerospace concept emerged within the Air Force through a long process that was both complex and dynamic. Even at its genesis, the idea was not the product of any single factor. General Arnold was the concept's wellspring, but his vision in the fall of 1944 was founded within a deep understanding of air power theory. It was also based upon a faith in emerging technologies that promised to reach beyond the atmosphere, and motivated by a commitment to the future of his organization and a concern that its resource competitors might be eyeing the same uncharted terrain.

During the first thirteen years of its existence, the aerospace idea moved from Arnold's mind out into broader reaches of the Air Force. Led by theory, prodded by leadership, and sheltered by emerging structures within the service that in turn funneled resources to push it yet further, the notion that the airman's domain extended naturally beyond the atmosphere progressed through the early and advanced stages of habitualization. The organization went from just thinking about the idea, to moving it into practice—not to where all airmen embraced the concept, but certainly to where it existed more than in the minds of just a few of the Air Force's senior leaders.

Moreover, virtually everything in the service's external environment during this period also encouraged this process. Early on, an interservice competitive threat fanned most of the Air Force's exo-atmospheric ambitions. As the cold war backdrop matured, however, the east-west tension became a steady and growing stimulant as well, which in turn spawned general technology developments and national security policies that both lent still further support to the aerospace concept's viability.

However, out of this same environment, to answer the same national security quandary that air power was addressing, space for peaceful purposes emerged as a strategic option for the Eisenhower administration. And when it eventually took hold, many of the dynamics that had been positively influencing the aerospace concept's institutionalization process until this point, both internal and external, changed. This in turn affected the concept's developmental course.

Sputnik, in generating the enormous public interest in space that it did, was a major catalyst to both perspectives. Within the Air Force, General White and his staff were effective in framing this interest in terms of the natural and ongoing expansion of the airman's domain. Wrapped comfortably within the logic of air power theory, and sporting now a single word moniker, the aerospace concept garnered increasing exposure and resonated instinctively with more and more airmen. There was no argument when the idea took up explicit residence in Air Force doctrine; it merely moved in to capture better the viewpoint that had implicitly always been there. Nor was there much resistance when the Dyna-Soar program emerged, embodying the concept in a system that the service suggested would be the foundation of its future force structure. In short, White leveraged *Sputnik* to infuse aerospace into the Air Force's mainstream perspective. The concept, over three year's time, moved well into the objectification phase of the institutionalization process. A broader and deeper consensus developed around the idea, though not to the point of becoming fully embraced or embodied. Looking back, however, we see how the most advanced stage of ideational development, recognized within the institutionalization process model as sedimentation, could never have occurred.

While White leveraged *Sputnik* to make explicit and proliferate within the Air Force its long implied perspective, outside Eisenhower succeeded in leveraging *Sputnik* as an opportunity for change. The president framed space as the start of a new idea, not just a continuation of the old. Space could be different, and he committed to making it so. He crafted policy, enacted law, created organizations and channeled resources toward securing his intent. Moreover, he cast his "space for peaceful purposes" perspective into the global market, where it tentatively found traction.

When Kennedy took office, the new president from a different political perspective could have dismantled much of Eisenhower's efforts, and in fact indicated in his campaign and early in his term that he might. Ultimately, however, he only furthered his predecessor's path, both domestically and on the international front. In so doing, by late 1963 the idea that space was a different place had effectively become locked in, a condition that accounts in a large respect for why we tend to view the environment above us this way still today.[6]

One nagging issue remains. If how we see the world influences our actions within it, why then did the Air Force, in the mid- to late 1950s, end up developing organizational structure and mobilizing resources *within its own walls* in a way that was antithetical to its apparent worldview? Part of the credit goes to General Schriever, who never accepted the aerospace concept (and candidly said so a few years after he retired: "It [aerospace] never got to a definition. There was a lot of talk about that, but that was mostly in terms of rhetoric in saying space is just a continuation of the atmosphere. …It never amounted to anything but words.")[7] In structuring the Air Force's R&D community as he did, Schriever consistently acted according to *his* worldview, not the Air Force's.

General White, however, also shares some of the credit. Although he clearly embraced the aerospace concept, and in so many respects was the primary force behind its continued development within the Air Force, he either failed to recognize or simply underestimated the need to establish organizational structure that aligned with his efforts. There is no evidence to indicate that White ever challenged any of Schriever's organizational choices. Indeed, his decision in November of 1960 to allow Schriever to move forward with a military space center proposal *as Schriever envisioned it,* in retrospect ended up undercutting much of the aerospace concept's penetration momentum that White had generated over the three years prior.

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[6] For a discussion on ideas as "cognitive locks," see Mark Blyth, "The Transformation of the Swedish Model: Economic Ideas, Distributional Conflict, and Institutional Change," *World Politics* 54 (October 2001): 4, 20-5.

[7] Bernard Schriever, General, U.S. Air Force, Oral History Interview by Lyn R. Officer and James O. Hasdorff, 20 June 1973, typed transcript, K239.0512-676, IRIS No. 1076785, in USAF AFHRA, 50.

The role of environmental context, however, is also apparent in this discussion. Before *Sputnik,* aerospace was essentially an unchallenged perspective within the Air Force. Under these conditions, the service's space-related programs, structures, or ideas, even if only space-related, still encouraged an aerospace viewpoint. They generally reinforced the idea that the airman's domain extended naturally beyond the atmosphere. However, after *Sputnik,* when Eisenhower's air and space perspective began to take hold outside of the Air Force, the existence of the service's space-specific things then began to impart a discouraging influence on the aerospace concept's institutional development. Moreover, given that these programs ultimately survived on resources garnered from beyond the service, it is reasonable to conclude that White, post-*Sputnik,* saw restructuring toward a more aerospace-like arrangement as potentially putting at risk what Air Force had already acquired in terms of its space responsibilities. In short, it is likely that White recognized the service's environmental constraints and accepted the structural inconsistency of Schriever's plan as the better of two less-preferred outcomes. Ironically, the aerospace concept's staunchest advocate, in so doing, made the odds considerably longer that the idea would ever progress from rhetoric to reality.

Notwithstanding the issue of extracting generalizations from a single example, what then does the developmental history of aerospace concept, as illuminated through the lens of institutionalism, offer to the broader subject of how ideas develop within organizations?

Most importantly, this study indicates that ideas come to persist within organizations through a process. Moreover, this process unfolds in three dimensions. An idea enters or begins somewhere within an organization's landscape and then seeps vertically through the organization's hierarchy, spreads horizontally across its subdivisions, and propagates temporally over time.

Secondly, this process is influenced by a variety of factors both within the organization's span of control and beyond it. This study suggests eight of consequence. Four are internal to the organization and directly influence ideational development. Four others together broadly describe the organization's contextual environment and influence the process indirectly. Note as well that these factors are interrelated in many ways, implying that one could potentially categorize or rearrange these factors in an alternative framework.

Within an organization, ideas need champions, sponsors who can empower them, who wield influence, and who are willing to focus effort on propagating their ideas across the three dimensions mentioned above. Leaders give ideas clout, which is important both for generating and sustaining ideational momentum within an organization. Because ideas that persist must also outlive their sponsors, sponsors must devote some level of effort to imparting an ideational legacy—something that begins to give an idea a life of its own, something that extends it somehow. General Arnold, for example, successfully passed on his vision that the Air Force's future included the realm beyond the atmosphere. White, among other things, gave the aerospace concept its name and had it infused within the service's basic doctrine.

Ideas that will persist also require persuasive arguments that justify their perpetuation. These arguments are crucial for initiating organizational support, and for generating, broadening, and strengthening further advocacy. The arguments must obviously resonate with an organization's internal perspective. Importantly, however, for an idea to persist, its justification must also share some degree of coherence with the organization's environmental context. Ideas that propagate, until they are fully embodied, will be subject to recurring evaluation with respect to an organization's internal and external reality. Thus, the theories that justify them must be consistent and coherent enough that the developing idea can weather these tests. Air power theory, in this case, speaks powerfully to airmen, but its coherency with the Air Force's external context—where space is concerned—will remain problematic as long as either America's space for peaceful purposes policy remains in place or air power theory adapts.

Idea champions and valid theory, however, are likely not sufficient enough alone to affect an idea's complete institutionalization. Ideas that endure and become embodied within organizations also need structural residence, some place on which to purchase, somewhere to adhere. Ideas expressed in organizational structure have a much better chance of persisting over the long run because structure, unlike personalities or argument, also endures. Structure, long after its occupants come and go, will continue to sustain and perpetuate the ideas it embodies. Moreover, structure provides a breeding ground for new generations of idea advocates and new perspectives of argument. Structure also channels the fourth internal factor influential to how ideas develop within organizations.

Resources are an organization's lifeblood. Accordingly, resources nourish ideas, stimulate their growth, and enable their application. Resources also illuminate the priority an organization places on an idea. In other words, the degree to which an organization applies its resources in support of an idea indicates the degree an organization is committed to it. As well, while resources generally flow from structure, they also create it, which partly describes the close relationship these two factors share. Air Force resources dedicated to ICBM development are what established the Western Development Division, which then expanded to become responsible for satellite development as well, which in turn made it a space-focused organization that became the Air Force's source for all of the service's space-focused ideas and programs.

An organization's internal dynamics, however, are not all that influence the process through which their ideas develop. Organizations share a symbiotic relationship with their environments. Its personnel are drawn from the environment; indeed they are individuals whose lives traverse the boundary between the organization and its environment on a daily basis. The resources an organization accrues are also garnered from the environment. Government agencies, for example, receive budget allocations. Businesses, public and private, capture market share. Non-profits gather grants and donations. In short, because of interdependencies such as these, a full appreciation for the dynamics of ideational development within organizations cannot disregard the influence an organization's external context plays in the process.

Essentially, the development of an organization's ideas is influenced in part by the forces of the market in which that organization competes. In capturing the nature and effect of these forces, not only do the organization's direct resource competitors matter, but so too does the market's broader landscape, that landscape's emerging technologies, the legislation that governs it, and the even broader trends within the world economy of which it is a part. In this study, the other militaries early on and the civilian space agencies thereafter, the emergence of space-enabling technologies, the national policies that guided Air Force action, and the broader landscape of the Cold War were the relevant translations of the broader environmental factors described above. All of them influenced Air Force actions with respect to space throughout its history. These actions in turn affected the aerospace concept's development, sometimes positively, sometimes not.

In sum, ideas that develop and persist within organizations do so when they have care and feeding, proponents who advocate them, structure to adhere to and embed within, and resources to sustain them. Moreover, their likelihood to persist, and to thereby increasingly influence the actions of the organization of which they are a part, is also very much dependent on the organization's contextual environment. This study thus suggests that ideas penetrate organizations through a complex and dynamic process that is influenced by several interrelated factors, some within the organization's realm of control and others beyond it. As a result of this process, ideas acquire their persistence over time and by degree, which explains why our understanding of it benefits from models that describe how institutions develop.

Chapter 9

Conclusion

It is one thing to make an idea clear and another to make it affecting to the imagination.

— Edmund Burke
A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful (1757)

This study argues the following thesis: *The development of the aerospace concept within the Air Force suggests that ideas emerge, permeate, and persist within organizations in the same way that institutions do within cultures*. It speaks therefore, in varying degrees, to three rather different audiences. To scholars of institutionalism theory, this study brings a modicum of cohesion and relevance to a diverse and fractured field. To those interested in ideas and their relationships to organizations, it builds perspective about how these relationships develop and what influences their course. Finally, the study should resonate in particular for those with an interest in the Air Force's history or its future.

With respect to institutionalism's diverse and divided theoretical landscape, this research has uncovered a bridge that exists between the field's historical and sociological schools. The institutionalization process model employed herein was a composite built from two completely different works. Though void of a single common reference between them, and derived through disparate approaches, Sikkink's characterization of the institutionalization process shares a strong correlation with Tolbert and Zucker's. For each to come from such dissimilar perspectives but arrive at such similar conclusions should interest scholars within the field, particularly those seeking to build commonalities across it. So too should this study's somewhat peculiar application of these models.

To some, setting ideas analogous to institutions might be considered stretching institutionalism theory beyond its intended use. Such activity runs the risk of obscuring definitions and diluting a theory's explanatory value. However, while the point is a reasonable one, so too is its inverse. The insights that theories offer beyond their intended domains are testaments to their strengths. Darwin's ideas have resonated across a multitude of fields extending well beyond biology or natural history. Complexity theory now captures the attention of economists, computer scientists, biologists, and physicists to name a few.[1] Indeed, it is now being considered for its applicability in understanding war. If institutionalism theory can help broaden our understanding of how ideas emerge, develop, and become embodied within organizations, that should be seen as a good thing. This study suggests it can.

Examining the relationship between organizations and ideas through the lens of institutionalism theory sheds valuable and unique light upon it. The approach establishes a temporal perspective and frames the relationship as one that develops by degree. It is not the case that ideas either do or do not influence organizational action. Rather, they do so gradually, to an extent that changes over time, and is dependent upon a variety of factors, some within the organization span of control, some outside of it, some obvious,

[1] M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* (New York: Simon & Schuster, 1992).

some not. For those who study organizations, or for those who operate within them, this research thus enables a more sophisticated approach for analyzing the dynamics that shape how organizations come to hold the ideas that they do. Scholars seeking broader understanding of the process can benefit from the approach. Actors looking to influence this process more effectively can benefit as well.

For airmen, this study has illuminated the origins and explained the causes of a long-simmering tension resident within the Air Force's walls. The bifurcation of air and space was first thrust upon the service in 1958 as a national security policy *choice*. Its structural and technological bifurcation—within the Air Force—was complete by the close of 1963. Cultural bifurcation emerged slowly and more fully thereafter over time. Conceptually, however, a significant connection between air and space remains. Aerospace is not the current picture in the Air Force's head; the concept currently fails to capture the way the service sees the world and does not significantly influence the organization's actions. Nor, however, has the idea disappeared. The reasons behind all of these things are now clear.

It should also be clear, however, that the idea of aerospace is not likely to disappear anytime soon. The latest generation of senior leadership within the Air Force has exorcised the word from the service's doctrine and declared that henceforth, air and space are two, not one. Such a choice certainly degrades the concept's persistence within the service, but does not completely erode it. As long as air power theory, in its current configuration, remains the intellectual guideline for the service, rumors of the concept's total demise will be premature. Moreover, there are other events, decisions, and developments foreseeable in the future that could emerge and exert further influence on the concept's institutionalization process.

The Air Force's external environment could return to conditions that might again stimulate the aerospace perspective within the service. Changes in the international security climate—another nation of consequence challenging the space for peaceful purposes regime for example—could begin to encourage such a shift. So too could a change in America's space policy. As long as space remains within the Air Force's realm of responsibility, a national policy choice to move toward space weaponization would likely encourage again the aerospace concept's institutional development. Such events or decisions are not at all beyond the realm of possibility.

Other possibilities exist within the Air Force. The continued high cost of operating in space and a resource-constrained environment are currently fueling the exploration of cheaper alternatives. One that has emerged—from the Air Force's space community no less—is a program that could house the military capabilities currently on orbit in much cheaper balloon-like systems that float high above the earth's surface, well clear of where aircraft and anti-aircraft systems can effectively operate, in a region currently being referred to "near space." If programs like this gain traction within the Air Force, or if the service's interest in pursuing Dyna-Soar like hypersonic technologies returns in force, the aerospace concept's development will again be stimulated.

Alternatively, future developments could further discourage the idea that air and space are one. Any organizational moves that would carve space away from the Air Force—redistributing space resources and personnel across all of the services, for example, or the most extreme choice to establish an independent space force all together—would accelerate the aerospace concept's demise. Technologies that ease the expense of space operations would also influence the concept similarly. The options are many, so too are the influences they would have. The broad point here is simply this.

The tension between what the Air Force thinks, what it says, and what it does is complex and dynamic in character, and, this tension is not easily alleviated. The service has certainly learned to live with it, and will continue to do so. However, a clearer understanding of its nature, where it comes from and what it is about, not only brings the Air Force a little more in touch with its past, it may also help to attenuate this tension to some degree.

Finally, this research is by no means conclusive. Its findings where the Air Force is concerned carry substantial conclusive weight, however, beyond that, a single case study can at most only imply broader applicability. Moreover, because the aerospace concept has failed thus far to progress beyond its partially institutionalized state, this study says nothing even about whether the later stages of the institutionalization process will offer similar explanatory value in understanding how ideas develop in their more mature form. Indications herein suggest it will, but for those sparked for whatever reason by this research, such questions are left to further inquiry.

Meanwhile, ideas remain ethereal things. We cannot smell them, touch them, taste them, hear them, or see them. Yet, they exist. And, as ideas affix themselves within our minds and within the organizations in which we coalesce, they increasingly shape the way we perceive the world around us, and as such begin to influence our actions within it. This means that they matter, and so too does our understanding of how they develop. Evaluating ideas as if they were institutions allows us to locate and track their developmental "footprints," to chronicle and examine more clearly their temporally progressive histories, and from there to predict with better confidence their future paths. This survey has illuminated all of these things with respect to the aerospace concept. So doing, it suggests a broader utility in the approach.

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